REPORT OF
AIR POLLUTION SOURCE TESTING
OF AN ETHYLENE OXIDE EMISSION-CONTROL SYSTEM
OPERATED BY STERIGENICS, LLC.
IN SALT LAKE CITY, UTAH
ON SEPTEMBER 27, 2018

Submitted to:

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
Division of Air Quality
150 North 1950 West
Salt Lake City, Utah 84114-4820

Submitted by:

STERIGENICS, LLC.
5725 West Harold Gatty Drive
Salt Lake City, Utah 84116

Prepared by:

ECSI, INC.
PO Box 1498
San Clemente, California 92674-1498

November 23, 2018

ECSi

CONTACT SUMMARY

CLIENT

Mr. Kevin Wagner
EHS Director
STERIGENICS, LLC.
2015 Spring Road, Suite 650
Oak Brook, Illinois 60523

Phone: (630)928-1771
FAX: (630)928-1701
Email: KWagner@sterigenics.com

FACILITY

Mr. Shawn Pollino
General Manager
STERIGENICS, LLC.
5725 West Harold Gatty Drive
Salt Lake City, Utah 84116

Phone: (801)328-9901
FAX: (801)328-9902
Email: SPollino@sterigenics.com

TEST DATE

Thursday, September 27, 2018

REGULATORY AGENCY

Mr. Chad Gilgen
Environmental Scientist, Minor Source Compliance
UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY (UDEQ)
Department of Air Quality
150 North 1950 West
Salt Lake City, Utah 84114-4820

Phone: (801)536-4237
FAX: (801)536-4099
Email: cgilgen@utah.gov

TESTING CONTRACTOR

Daniel P. Kremer
President
ECSi, Inc.
PO Box 1498
San Clemente, California 92674-1498

Phone: (949)400-9145
FAX: (949)281-2169
email: dankremer@ecsi1.com

TABLE OF CONTENTS

ECSi

LIST OF TABLES

ECSi

LIST OF APPENDICES

ECSi

1.0 INTRODUCTION

On Wednesday, September 27, 2018, ECSi, Inc. performed air pollution source testing of an ethylene oxide (EtO) emission-control device operated by Sterigenics, LLC. in Salt Lake City, Utah. The control device tested was a two-stage Advanced Air Technologies Safe Cell emission-control system, which is currently used to control emissions from fourteen EtO aeration cells. The purpose of the testing program was to demonstrate continued compliance with the conditions established in the Air Quality Permit granted to Sterigenics by the Utah Department of Environmental Quality (UDEQ).

2.0 EQUIPMENT

The EtO gas-sterilization system is comprised of ten commercial sterilizers, which are discharged through liquid-ring vacuum pumps to a Ceilcote packed tower scrubber emission-control system, ten sterilizer exhaust vents (backvents), which were discharged to atmosphere at the time of the test, and fourteen aeration cells, which are discharged to an existing two-stage Advanced Air Technologies (AAT) Safe Cell emission-control system. As an alternative emission-control scenario, the facility also has the capability to discharge the sterilization chamber vacuum pumps to the existing AAT Safe Cell system. The gas-sterilization and emission-control equipment consist of the following:

- Six Vacudyne Gas Sterilizers, all Model 810, each comprised of a steam-heated 795 cubic foot interior volume sterilization chamber, a recirculating vacuum pump chamber evacuation system, a backdraft valve, and a fugitive emissions exhaust hood;

- One Vacudyne Gas Sterilizer comprised of a steam-heated 3600 cubic foot interior volume sterilization chamber, a recirculating vacuum pump chamber evacuation system, a backdraft valve, and a fugitive emissions exhaust hood;

- One American Sterilizer Company Gas Sterilizer, Model 1200, comprised of a steam-heated 1133 cubic foot interior volume sterilization chamber, a recirculating vacuum pump chamber evacuation system, a backdraft valve, and a fugitive emissions exhaust hood;

- One Environmental Tectonics Corporation Gas Sterilizer, Model 1035, comprised of a steam-heated 283 cubic foot interior volume sterilization chamber, a recirculating vacuum pump chamber evacuation system, a backdraft valve, and a fugitive emissions exhaust hood;

- One National Sterilizer Company Gas Sterilizer, comprised of a steam-heated 35 cubic foot interior volume sterilization chamber, a recirculating vacuum pump chamber evacuation system, a backdraft valve, and a fugitive emissions exhaust hood

- Fourteen Aeration Chambers, each comprised of a heated aeration chamber and a chamber exhaust system.

Sterilizer vacuum pump emissions are be controlled by:

- One Ceilcote packed tower chemical scrubber, equipped with: a reaction/interface column, 29’ 4” high, 48” in diameter, with a 20’ bed of #1 Tellerette packing; a 150 GPM scrubber fluid recirculation system; and two 17,000 gallon reaction/storage tanks.

Aeration emissions are controlled by:

- One two-stage Advanced Air Technologies Safe Cell emission-control system, comprised of a packed-tower chemical scrubber (SC1), equipped with a packed reaction/interface column, a scrubber fluid recirculation system, and a scrubber fluid reaction/storage tank, and a dry bed reactor/scrubber (SC2), comprised of a bank of solid-bed reaction vessels, connected in parallel, installed downstream of SC1 and upstream of a dedicated blower exhaust system.

3.0 TESTING

EtO source testing was conducted in accordance with the procedures outlined in USEPA CFR40, Part 63.365, utilizing USEPA Method 18. EtO emissions monitoring was conducted simultaneously at the inlet and outlet of the AAT Safe Cell System during a one-hour interval of the 24-hour aeration process. A total of three test runs were performed.

During aeration testing, EtO emissions at the inlet and the outlet of the AAT Safe Cell System were determined using direct source sample injection into the gas chromatograph (GC). All aeration testing was performed using freshly sterilized product. The testing program was conducted in accordance with the procedures outlined in the following sections.

4.0 RULE/COMPLIANCE REQUIREMENTS

The EtO gas-sterilization system at Sterigenics was tested to demonstrate compliance with the EPA requirements, as specified in the UDEQ Air Quality Permit. The following requirements must be met:

- The emissions from the aeration process must be discharged to control equipment with an EtO emission-reduction efficiency of at least 99.0% by weight.

Testing is required to demonstrate compliance with these requirements. Source testing of the AAT Safe Cell System is required initially, and must be performed once every 5 years thereafter.

5.0 TEST METHOD REFERENCE

5.1 INTRODUCTION

EtO source testing was conducted in accordance with the procedures outlined in USEPA CFR40, Part 63.365, utilizing USEPA Method 18. EtO emissions monitoring was conducted simultaneously at the inlet and outlet of the AAT Safe Cell System during a one-hour interval of the 24-hour aeration process. A total of three test runs were performed.

During aeration testing, EtO emissions at the inlet and the outlet of the AAT Safe Cell System were determined using direct source sample injection into the gas chromatograph (GC). All aeration testing was performed using freshly sterilized product. The testing program was conducted in accordance with the procedures outlined in the following sections.

Operation and documentation of process conditions was performed by personnel from Sterigenics, LLC. using existing monitoring instruments installed by the manufacturer on the equipment to be tested. In accordance with the procedures established in USEPA CFR40, Part 63, Subpart O, scrubber liquor level was recorded. This parametric monitoring data is attached as Appendix G.

5.2 VOLUMETRIC FLOW MEASUREMENT

Exhaust gas flow at the outlet of the scrubber was determined by 40 CFR 60, Appendix A, Method 2, using an s-type pitot tube and an inclined-oil manometer. Sampling ports were located in accordance with 40 CFR 60, Appendix A, Method 1. The test ports were located far enough from any flow disturbances to permit accurate flow measurement.

Temperature measurements were obtained from a type K thermocouple and thermometer attached to the sampling probe. Exhaust gas composition was assumed to be air and small amounts of water vapor. Water vapor was negligible and, based on previous test data, a value of 2 percent was used for flow calculations.

5.3 CONTROL EFFICIENCY AND MASS EMISSIONS MEASUREMENT

During the aeration process, EtO emissions at the inlet and outlet of the AAT Safe Cell System were determined using direct source sample injection into the GC. The mass of EtO emitted from the outlet was determined using the equation shown below in Section 5.9. Mass-mass control-efficiency of EtO during the aeration process was calculated by comparing the mass of EtO vented to the system inlet to the mass of EtO vented from the system outlet.

During aeration, vented gas was analyzed by an SRI, Model 8610, portable gas chromatograph (GC), equipped with the following: dual, heated sample loops and injectors; dual columns; and dual detectors. A flame ionization detector (FID) was used to quantify inlet EtO emissions, and a photoionization detector (PID) was used to quantify low-level EtO emissions at the emission-control system outlet.

5.4 SAMPLE TRANSPORT

Source gas was pumped to the GC at approximately 500-1000 cubic centimeters per minute (cc/min) from the sampling ports through two lengths of heated Teflon® sample line, each with a nominal volume of approximately 75 cubic centimeters (cc) and an outer diameter of 0.25 inch. At the inlet of the Safe Cell System, the sampling port was located in the plenum immediately upstream of the packed tower scrubber. At the outlet of the Safe Cell System, sampling ports were located in the exhaust stack downstream of the dry bed reactors.

5.5 GC INJECTION

Source-gas samples were then injected into the GC which was equipped with two heated sampling loops, each containing a volume of approximately 2cc and maintained at 100 degrees Celsius (C). Injections occurred at approximately five-minute intervals during aeration testing. Helium was the carrier gas for both the FID and the PID.

5.6 GC CONDITIONS

The packed columns for the GC were both operated at 90 degrees C. The columns were stainless steel, 6 feet long, 0.125 inch outer diameter, packed with 1 percent SP-1000 on 60/80 mesh Carbopack B.

During the analysis, the FID was operated at 250 degrees C. The support gases for the FID were hydrogen (99.995% pure) and air (99.9999% pure). Any unused sample gas was vented from the GC system back to the inlet of the control device being tested.

5.7 CALIBRATION STANDARDS

The FID was calibrated for mid-range part-per-million-by-volume (ppmv) level analysis using gas proportions similar to the following:

1) 100 ppmv EtO, balance nitrogen
2) 50 ppmv EtO, balance nitrogen (audit gas)
3) 10 ppmv EtO, balance nitrogen
4) 1 ppmv EtO, balance nitrogen

The PID was calibrated for low-range ppmv level analyses using gas proportions similar to the following:

1) 100 ppmv EtO, balance nitrogen
2) 50 ppmv EtO, balance nitrogen (audit gas)
3) 10 ppmv EtO, balance nitrogen
4) 1 ppmv EtO, balance nitrogen

Each of these calibration standards was in a separate, certified manufacturer's cylinder. Copies of the calibration gas laboratory certificates are attached as Appendix F.

5.8 SAMPLING DURATION

Since aeration is a 24-hour process at this facility, with constant discharge flow from the aeration chambers to the emission-control system, aeration testing consisted of three 1-hour test runs. Each test run was performed with freshly sterilized product in the aeration chambers.

5.9 CONTROL-EFFICIENCY/MASS-EMISSIONS CALCULATIONS

Mass emissions of EtO during aeration were calculated using the following equation:

$$MassRate = (VolFlow)(MolWt)(ppmv\ EtO/10^6)/(MolVol)$$

Where:

MassRate	=	EtO mass flow rate, pounds per minute
VolFlow	=	Corrected volumetric flow rate, standard cubic feet per minute at 68 degrees F
MolWt	=	44.05 pounds EtO per pound mole
ppmv EtO	=	EtO concentration, parts per million by volume
10^6	=	Conversion factor, ppmv per "cubic foot per cubic foot"
MolVol	=	385.32 cubic feet per pound mole at one atmosphere and 68 degrees F

Results of the control-efficiency testing are presented in Section 8.0 and in Tables 1 and 2.

ECSi

6.0 TEST SCENARIO

The aeration testing was performed during normal process load conditions. Three aeration test runs were conducted in series to verify the performance of the emission-control system. The testing schedule was as follows:

1) Testing equipment was set up and calibrated.
2) Aeration Phase Test Run #1 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the Safe Cell System.
3) Aeration Phase Test Run #2 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the Safe Cell System.
4) Aeration Phase Test Run #3 was conducted with freshly sterilized product in aeration. Sampling was performed at the inlet and the outlet of the Safe Cell System.
5) Post calibration check was performed, testing equipment was packed.

7.0 QA/QC

7.1 FIELD TESTING QUALITY ASSURANCE

At the beginning of the test, the sampling system was leak checked at a vacuum of 15 inches of mercury. The sampling system was considered leak free when the flow indicated by the rotameters fell to zero.

At the beginning of the test, a system blank was analyzed to ensure that the sampling system was free of EtO. Ambient air was introduced at the end of the heated sampling line and drawn through the sampling system line to the GC for analysis. The resulting chromatogram also provided a background level for non-EtO components (i.e. ambient air, carbon dioxide, water vapor) which are present in the source gas stream due to the ambient dilution air which is drawn into the emission-control device, and due to the destruction of EtO by the emission-control device which produces carbon dioxide and water vapor. This chromatogram, designated AMB, is included with the calibration data in Appendix A.

7.2 CALIBRATION PROCEDURES

The GC system was calibrated at the beginning and conclusion of each day's testing. Using the Peaksimple II analytical software, a calibration curve was constructed for each detector. A seven point injection of the lowest concentration calibration standard will be used to establish the method detection limit for the test.

A gas cylinder of similar composition as the calibration gases, but certified by a separate supplier, was used to verify calibration gas composition and GC performance.

All calibration gases and support gases used were of the highest purity and quality available. A copy of the laboratory certification for each calibration gas is attached as Appendix F.

8.0 TEST RESULTS

The AAT Safe Cell System demonstrated an EtO control efficiency of 99.73 percent. In accordance with EPA requirements, as specified in the UDEQ Air Quality Permit, this control equipment must have an EtO control efficiency of 99 percent or more in control of emissions from the aeration process. The AAT Safe Cell System met this requirement.

The test results are summarized in Tables 1 and 2. These tables include results for EtO control efficiency, and EtO mass control efficiency, of the emission-control device. Chromatograms and chromatographic supporting data are attached as Appendices A through D. Copies of field data and calculation worksheets are attached as Appendix E.

TABLES

TABLE 1
ETHYLENE OXIDE CONTROL EFFICIENCY - AERATION
OF AN ETHYLENE OXIDE EMISSION CONTROL DEVICE
OPERATED BY STERIGENICS, INC.
IN SALT LAKE CITY, UTAH
ON SEPTEMBER 27, 2018

RUN NUMBER	INJECTION TIME	INLET ETO CONC. (PPM)(1)	OUTLET ETO CONC. (PPM)(2)	ETO CONTROL EFFICIENCY
1(3)	900	29.8	0.08	99.7315
1	905	29.9	0.08	99.7324
1	910	31.0	0.08	99.7419
1	915	28.4	0.08	99.7183
1	920	27.7	0.08	99.7112
1	925	29.5	0.08	99.7288
1	930	27.5	0.08	99.7091
1	935	29.0	0.08	99.7241
1	940	29.5	0.08	99.7288
1	945	28.4	0.08	99.7183
1	950	31.0	0.08	99.7419
1	955	28.9	0.08	99.7232
2(4)	1000	29.0	0.08	99.7241
2	1005	29.3	0.08	99.7270
2	1010	28.4	0.08	99.7183
2	1015	28.2	0.08	99.7163
2	1020	29.0	0.08	99.7241
2	1025	28.0	0.08	99.7143
2	1030	28.1	0.08	99.7153
2	1035	28.1	0.08	99.7153
2	1040	27.4	0.08	99.7080
2	1045	27.7	0.08	99.7112
2	1050	27.3	0.08	99.7070
2	1055	27.2	0.08	99.7059
3(5)	1100	27.3	0.08	99.7070
3	1105	27.3	0.08	99.7070
3	1110	26.3	0.08	99.6958
3	1115	25.8	0.08	99.6899
3	1120	26.2	0.08	99.6947
3	1125	25.6	0.08	99.6875
3	1130	28.9	0.08	99.7232
3	1135	31.3	0.08	99.7444
3	1140	31.8	0.08	99.7484
3	1145	35.6	0.08	99.7753
3	1150	41.8	0.08	99.8086
3	1155	46.3	0.08	99.8272
TIME-WEIGHTED AVERAGE:		**29.51**	**0.0800**	**99.7252**
		UDEQ REQUIRED CONTROL EFFICIENCY:		**99%**

Notes:
(1) - PPM = parts per million by volume
(2) - 0.08 ppm is the quantification limit for the detector used at the outlet.
(3) - Aeration Phase Test Run #1 started at 08:58, ended at 09:58.
(4) - Aeration Phase Test Run #2 started at 09:58, ended at 10:58.
(5) - Aeration Phase Test Run #3 started at 10:58, ended at 11:58.

ECSi

TABLE 2
ETHYLENE OXIDE MASS CONTROL EFFICIENCY
OF AN ETHYLENE OXIDE EMISSION CONTROL SYSTEM
OPERATED BY STERIGENICS, INC.
IN SALT LAKE CITY, UTAH
ON SEPTEMBER 27, 2018

EMISSIONS STREAM	INLET ETO MASS FLOW (1)	OUTLET ETO MASS FLOW (1)	ETO MASS CONTROL EFFICIENCY (2)
Aeration	0.033547	0.000091	99.7287

Notes:
(1) - lbs/min = pounds per minute
(2) - % control efficiency

ECSi

APPENDICES

APPENDIX A

Calibration Data

ECSi

Detection Limit Study

Step 1 : Prepare and analyze at least seven standards prepared at or near the estimated detection limit

Step 2 : Record and calculate the standard deviation of the replicate measurements.

Analysis Number	1	2	3	4	5	6	7	8	9	10
Result	1.408	1.400	1.404	1.408	1.456	1.452	1.456			

Calculated Standard Deviation = 0.0267

Step 3 : Determine the Method Detection Limit (MDL) by mulitplying the student T value appropriate for 99% confidence level and the standard deviation estimate with in n-1 degrees of freedom

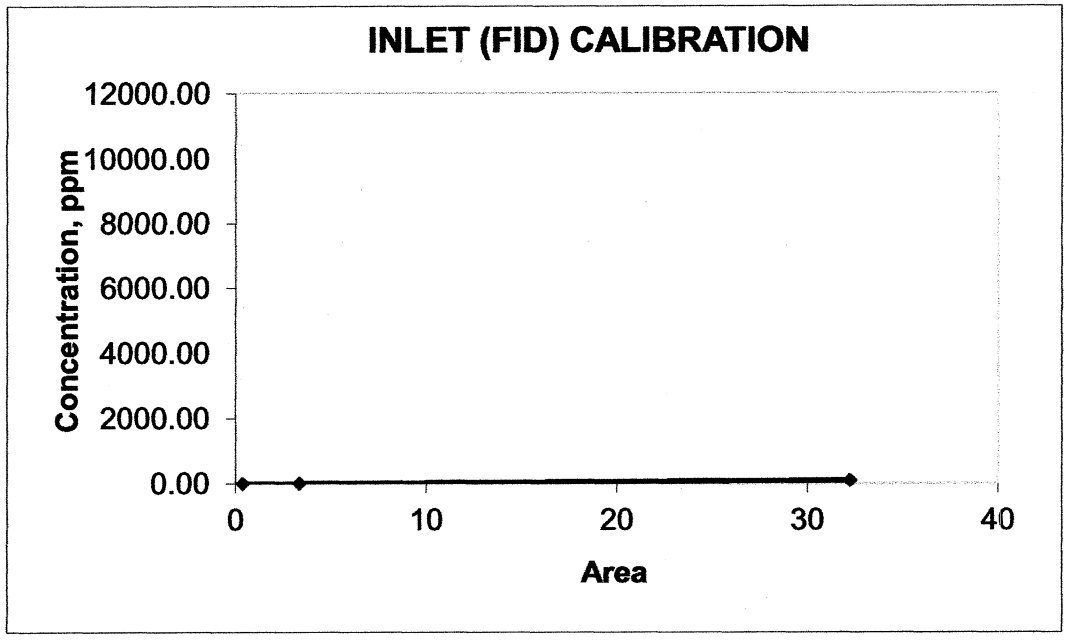
Number of Replicates	7	8	9	10
T-values	3.143	2.998	2.896	2.821

Method Detection Limit: = 0.08

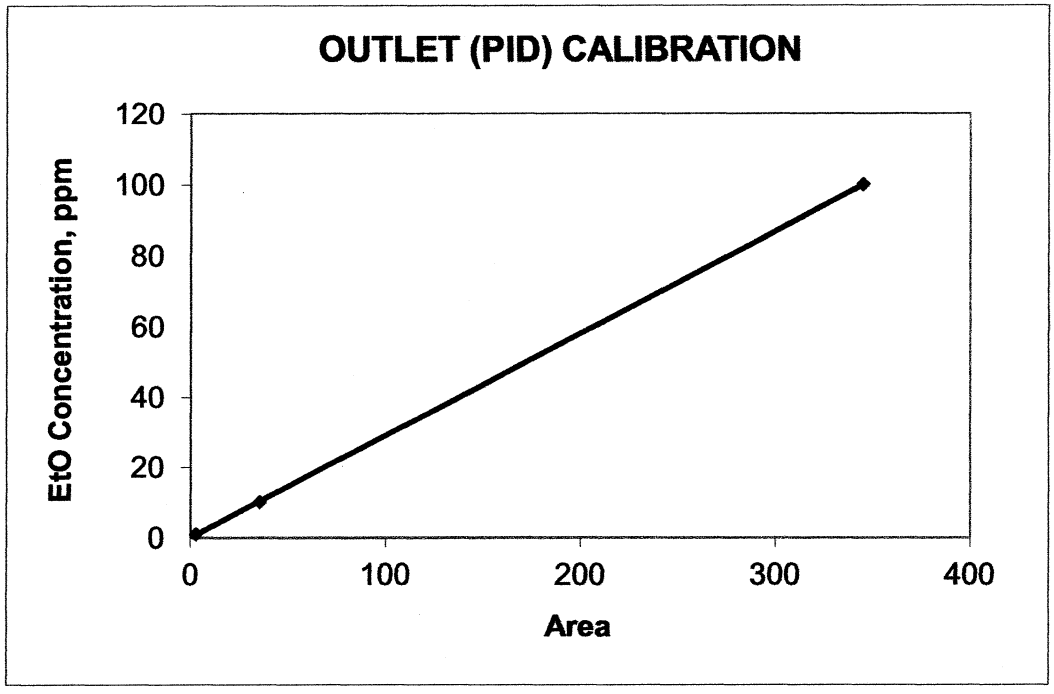
	1.1	10.1	100		
1	3.74			1.40778	y = 0.397X -0.077
2	3.72			1.39984	y = 0.397X -0.077
3	3.73			1.40381	y = 0.397X -0.077
4	3.74			1.40778	y = 0.401x -0.0339
5	3.73			1.45583	y = 0.401x -0.0339
6	3.72			1.45182	y = 0.401x -0.0339
7	3.73			1.45583	y = 0.401x -0.0339

EtO Calibrations

Site: **Sterigenics - Salt Lake City**
Date: **9/27/2018**

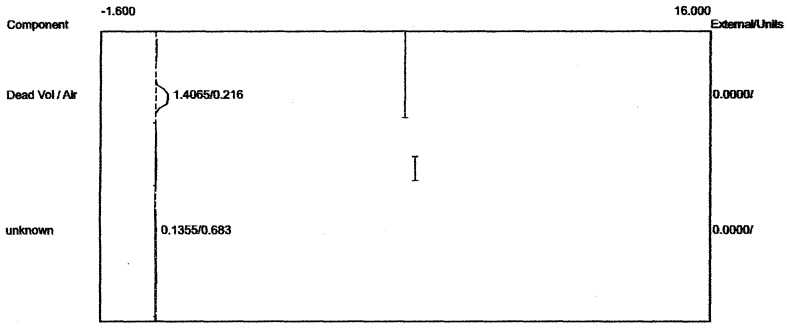


Slope **3.10**
Intercept **-0.09**



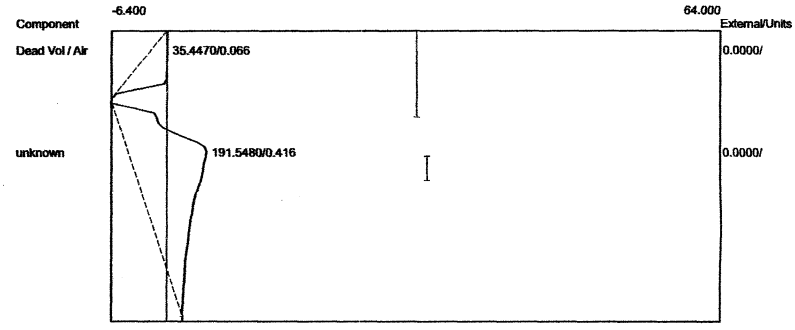
Slope **0.290**
Intercept **0.0516**

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:00:28
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



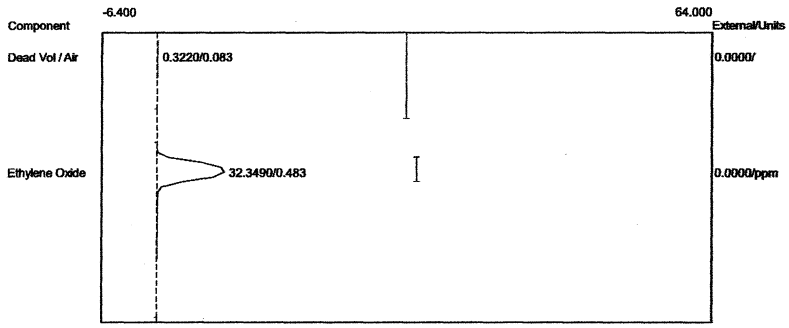
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4065	0.0000	
		1.4065	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:00:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-Amb.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



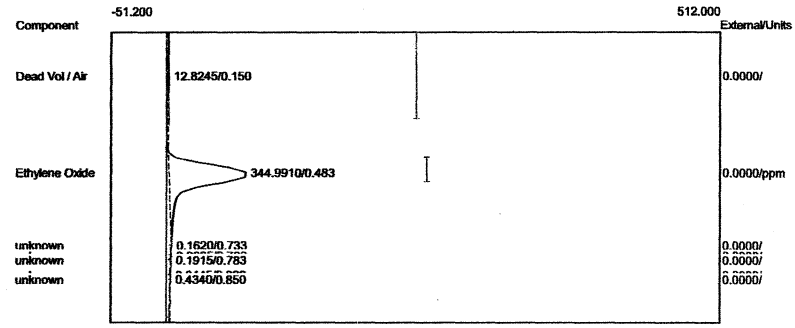
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	35.4470	0.0000	
		35.4470	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:12:32
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C01.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



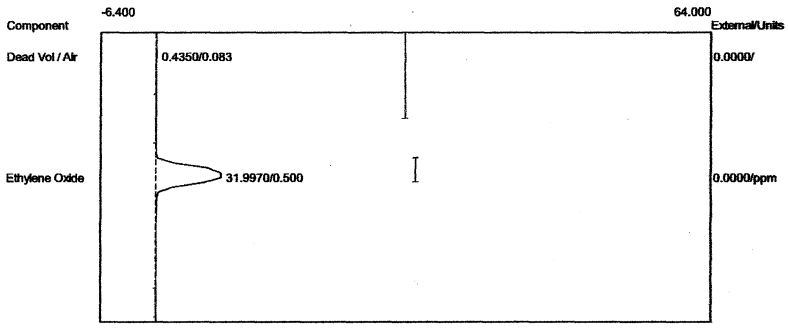
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	0.3220	0.0000	
Ethylene Oxide	0.483	32.3490	0.0000	ppm
		32.6710	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:12:32
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C01.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



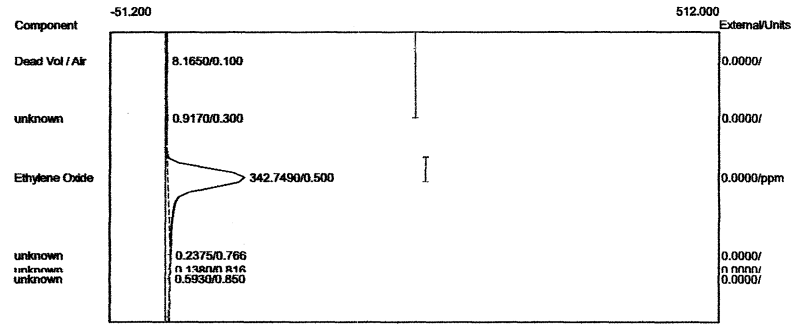
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	12.8245	0.0000	
Ethylene Oxide	0.483	344.9910	0.0000	ppm
		357.8155	0.0000	

Lab name: ESSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:15:49
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C02.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



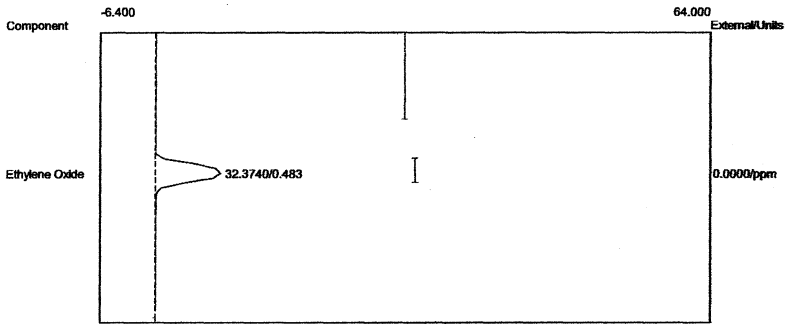
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	0.4350	0.0000	
Ethylene Oxide	0.500	31.9970	0.0000	ppm
		32.4320	0.0000	

Lab name: ESSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:15:49
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C02.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



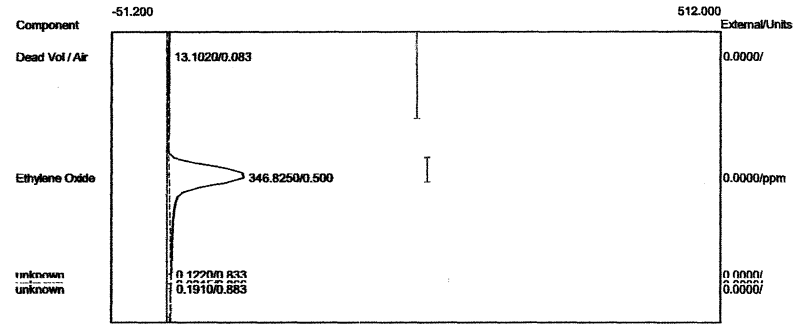
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	8.1650	0.0000	
Ethylene Oxide	0.500	342.7490	0.0000	ppm
		350.9140	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:19:04
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C03.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



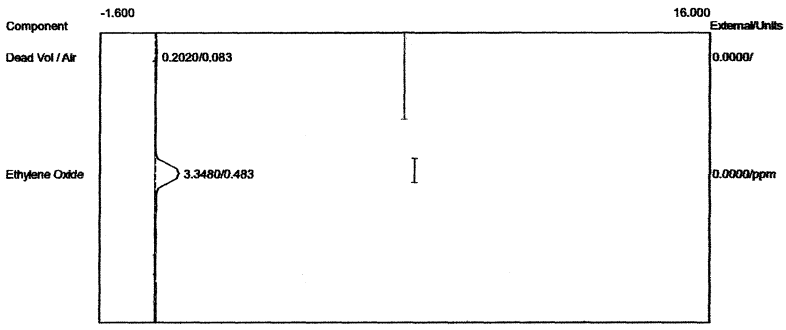
Component	Retention	Area	External	Units
Ethylene Oxide	0.483	32.3740	0.0000	ppm
		32.3740	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:19:04
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C03.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



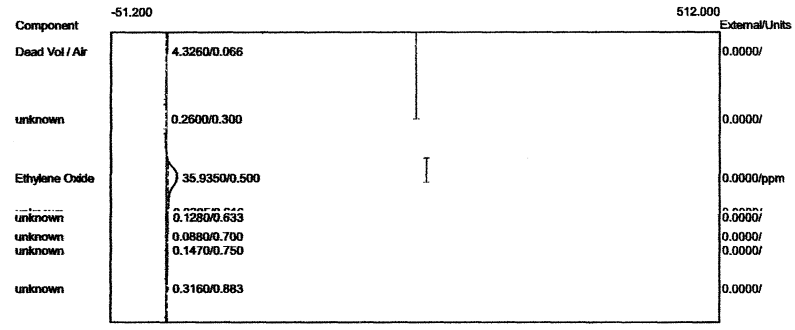
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	13.1020	0.0000	
Ethylene Oxide	0.500	346.8250	0.0000	ppm
		359.9270	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:21:53
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C04.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



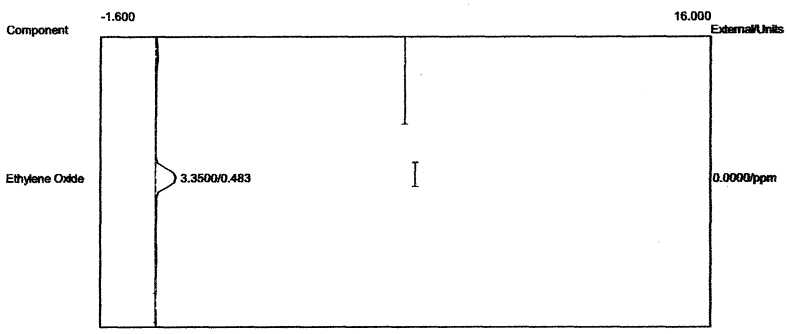
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	0.2020	0.0000	
Ethylene Oxide	0.483	3.3480	0.0000	ppm
		3.5500	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:21:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C04.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



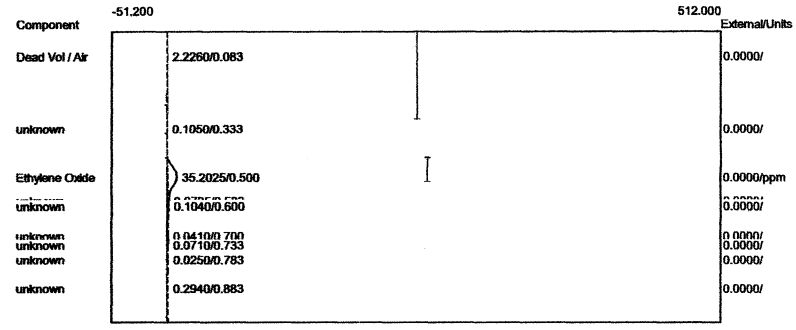
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	4.3260	0.0000	
Ethylene Oxide	0.500	35.9350	0.0000	ppm
		40.2610	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:25:53
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C05.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



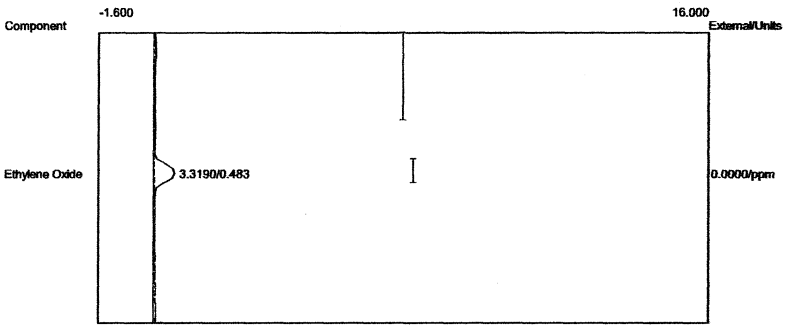
Component	Retention	Area	External	Units
Ethylene Oxide	0.483	3.3500	0.0000	ppm
		3.3500	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:25:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C05.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



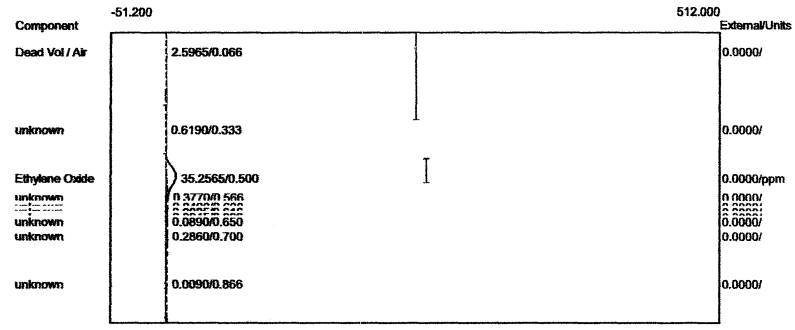
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	2.2260	0.0000	
Ethylene Oxide	0.500	35.2025	0.0000	ppm
		37.4285	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:29:21
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C06.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



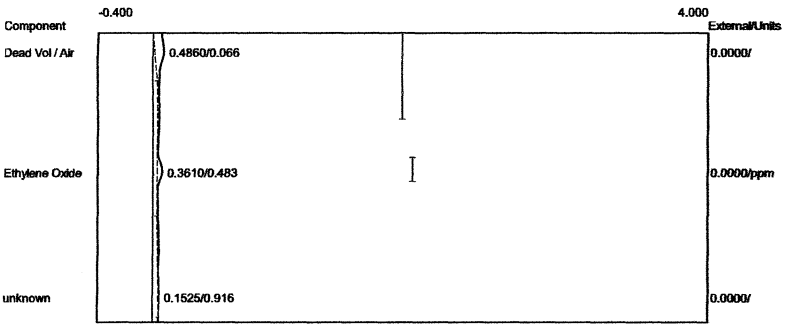
Component	Retention	Area	External	Units
Ethylene Oxide	0.483	3.3190	0.0000	ppm
		3.3190	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:29:21
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C06.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



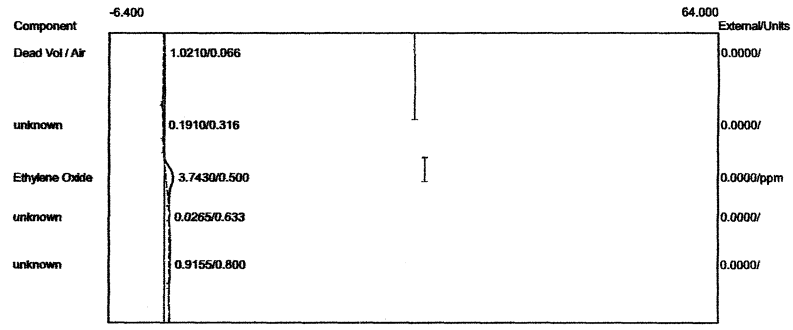
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	2.5965	0.0000	
Ethylene Oxide	0.500	35.2565	0.0000	ppm
		37.8530	0.0000	

Lab name: ESSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:32:55
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C07.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



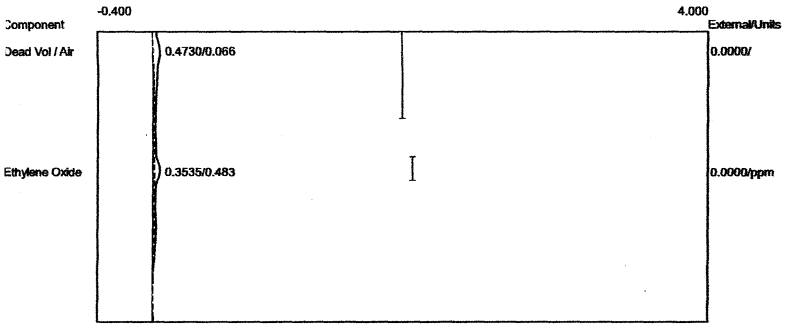
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	0.4860	0.0000	
Ethylene Oxide	0.483	0.3610	0.0000	ppm
		0.8470	0.0000	

Lab name: ESSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:32:55
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C07.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



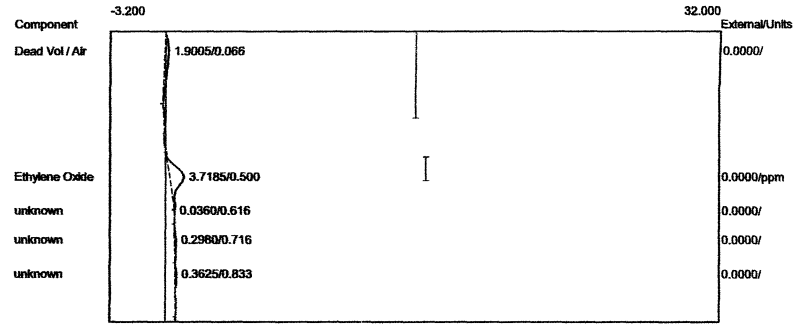
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	1.0210	0.0000	
Ethylene Oxide	0.500	3.7430	0.0000	ppm
		4.7640	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:36:53
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C08.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



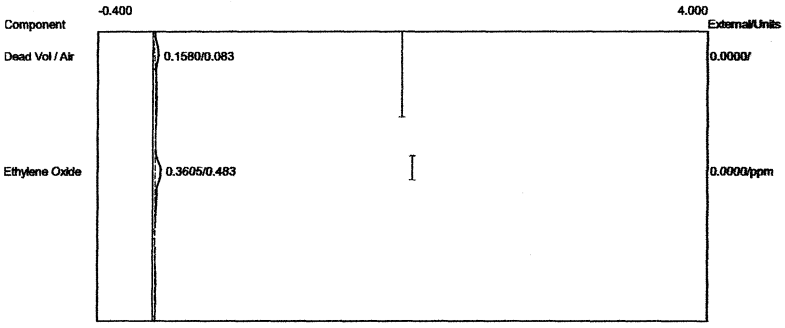
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	0.4730	0.0000	
Ethylene Oxide	0.483	0.3535	0.0000	ppm
		0.8265	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:36:53
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C08.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



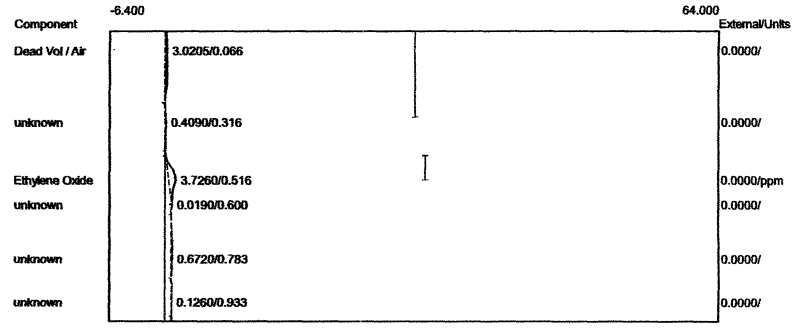
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	1.9005	0.0000	
Ethylene Oxide	0.500	3.7185	0.0000	ppm
		5.6190	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:40:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C09.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



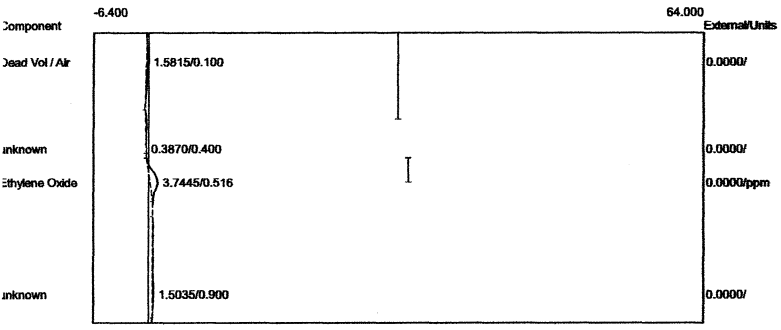
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	0.1580	0.0000	
Ethylene Oxide	0.483	0.3605	0.0000	ppm
		0.5185	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:40:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C09.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



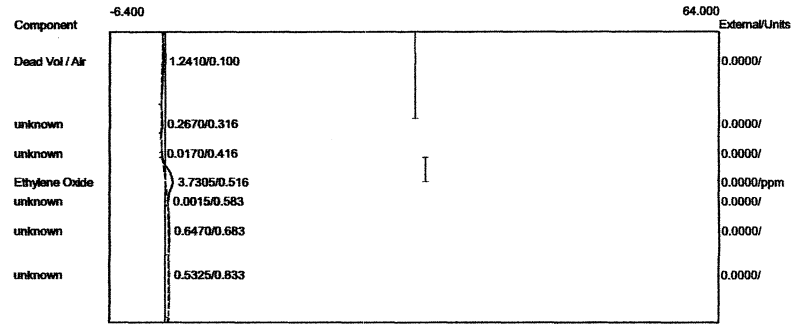
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	3.0205	0.0000	
Ethylene Oxide	0.516	3.7260	0.0000	ppm
		6.7465	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:48:00
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 2SterSLC2018-C10.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



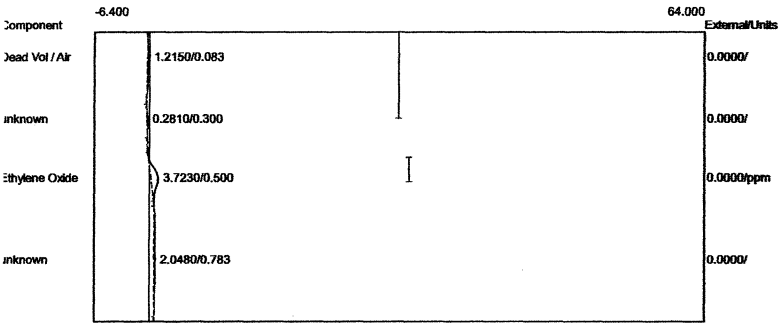
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	1.5815	0.0000	
Ethylene Oxide	0.516	3.7445	0.0000	ppm
		5.3260	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 07:54:35
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C11.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



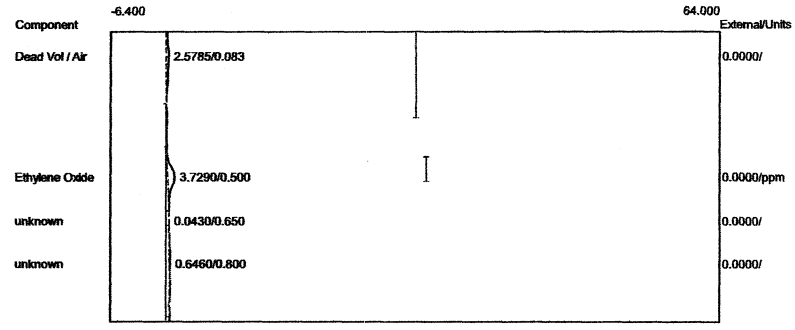
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	1.2410	0.0000	
Ethylene Oxide	0.516	3.7305	0.0000	ppm
		4.9715	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 08:01:28
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 2SterSLC2018-C12.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



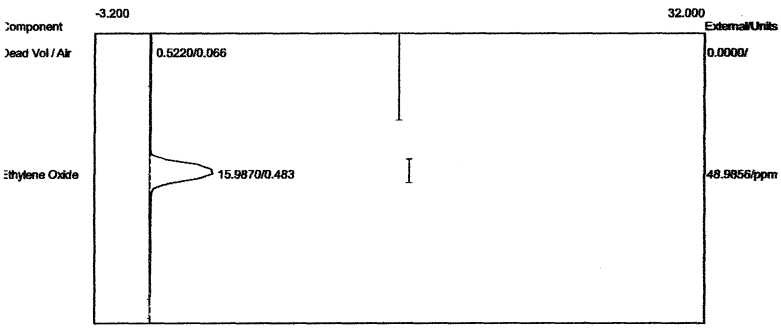
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	1.2150	0.0000	
Ethylene Oxide	0.500	3.7230	0.0000	ppm
		4.9380	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 08:03:30
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C13.CHR (c:\peak359)
Sample: 1.10 ppm std
Operator: D. Kremer



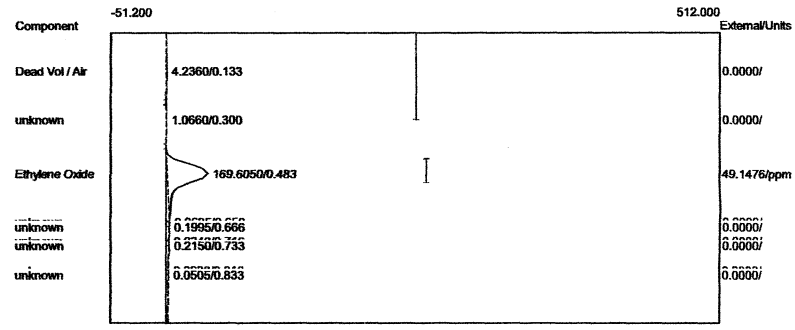
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	2.5785	0.0000	
Ethylene Oxide	0.500	3.7290	0.0000	ppm
		6.3075	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 08:17:39
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-C10.CHR (c:\peak359)
Sample: 48.8 ppm audit std
Operator: D. Kremer



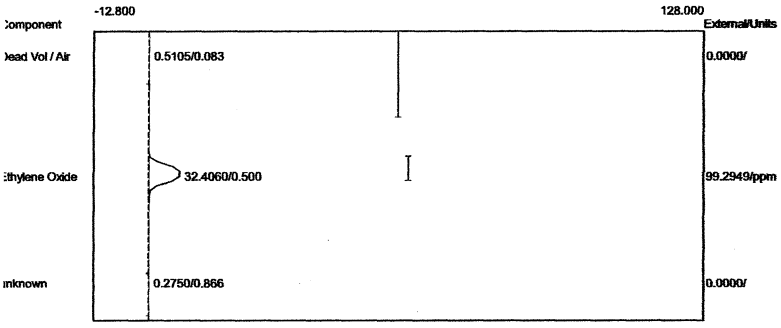
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	0.5220	0.0000	
Ethylene Oxide	0.483	15.9870	48.9856	ppm
		16.5090	48.9856	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 08:17:39
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-C14.CHR (c:\peak359)
Sample: 48.8 ppm audit std
Operator: D. Kremer



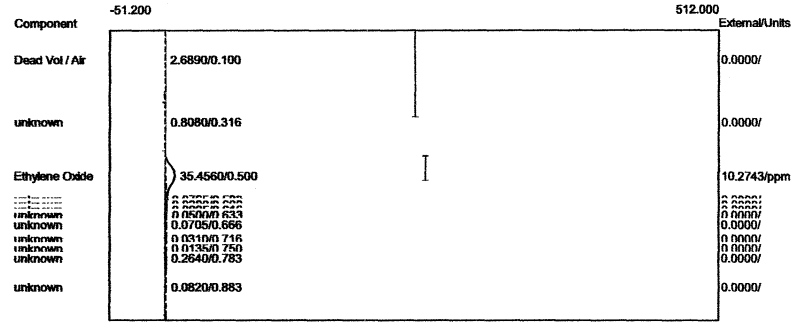
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	4.2360	0.0000	
Ethylene Oxide	0.483	169.6050	49.1476	ppm
		173.8410	49.1476	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: BiasCal
Analysis date: 09/27/2018 08:46:03
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-Bias.CHR (c:\peak359)
Sample: 100 ppm std
Operator: D. Kremer



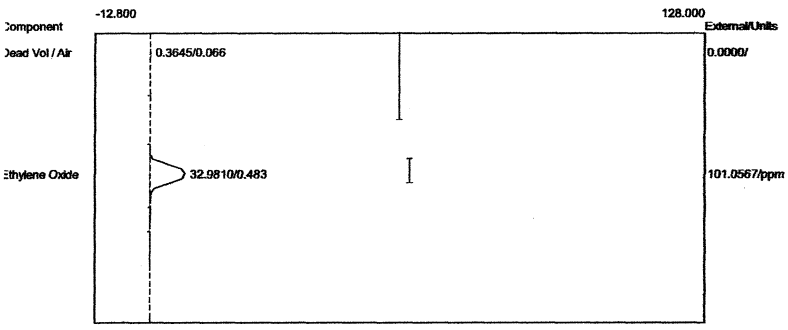
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	0.5105	0.0000	
Ethylene Oxide	0.500	32.4060	99.2949	ppm
		32.9165	99.2949	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: BiasCal
Analysis date: 09/27/2018 08:51:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-Bias.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer



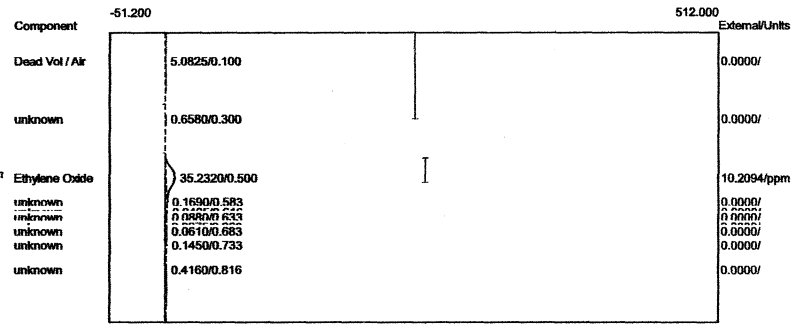
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	2.6890	0.0000	
Ethylene Oxide	0.500	35.4560	10.2743	ppm
		38.1450	10.2743	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 13:22:46
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterSLC2018-PostCal.CHR (c:\peak359)
Sample: Ambient Background
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.066	0.3645	0.0000	
Ethylene Oxide	0.483	32.9810	101.0567	ppm
		33.3455	101.0567	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: PreCal
Analysis date: 09/27/2018 13:26:49
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-PostCal.CHR (c:\peak359)
Sample: 10.1 ppm std
Operator: D. Kremer

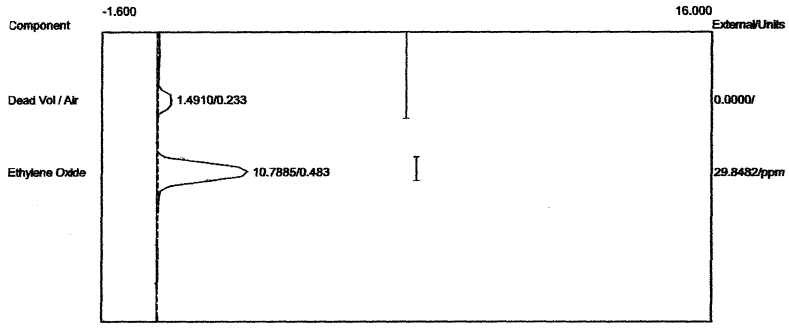


Component	Retention	Area	External	Units
Dead Vol / Air	0.100	5.0825	0.0000	
Ethylene Oxide	0.500	35.2320	10.2094	ppm
		40.3145	10.2094	

APPENDIX B

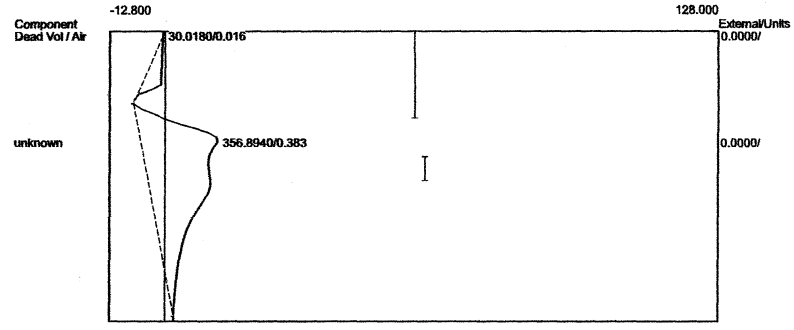
Run#1 Chromatograms

Lab name: EOSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:00:52
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A01.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



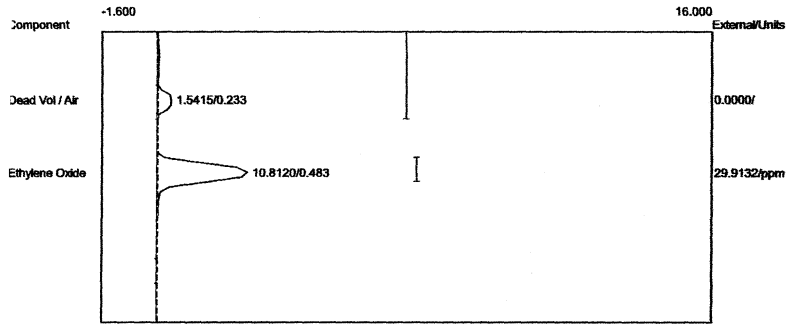
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4910	0.0000	
Ethylene Oxide	0.483	10.7885	29.8482	ppm
		12.2795	29.8482	

Lab name: EOSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:00:52
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A01.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



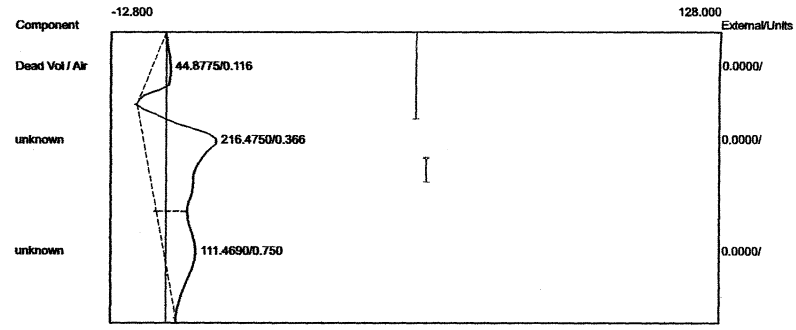
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	30.0180	0.0000	
		30.0180	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:05:12
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A02.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



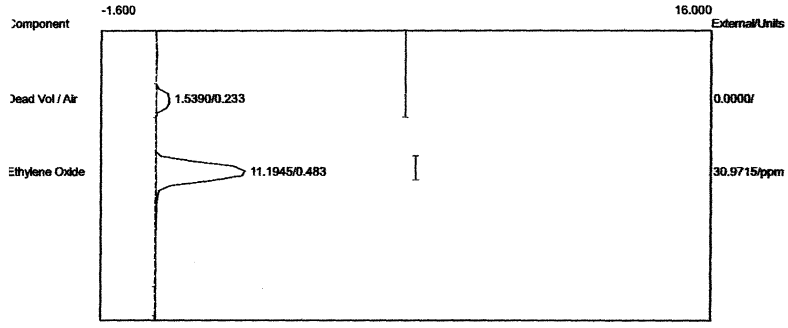
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.5415	0.0000	
Ethylene Oxide	0.483	10.8120	29.9132	ppm
		12.3535	29.9132	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:05:12
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A02.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



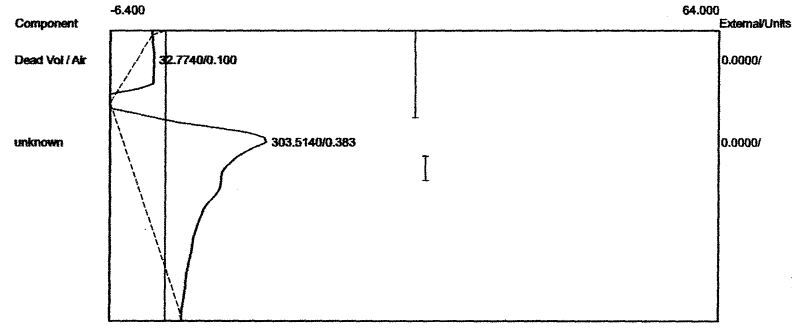
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	44.8775	0.0000	
		44.8775	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:10:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A03.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



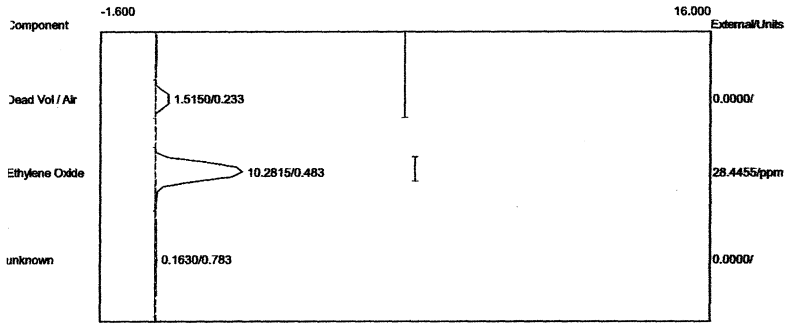
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.5390	0.0000	
Ethylene Oxide	0.483	11.1945	30.9715	ppm
		12.7335	30.9715	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:10:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A03.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



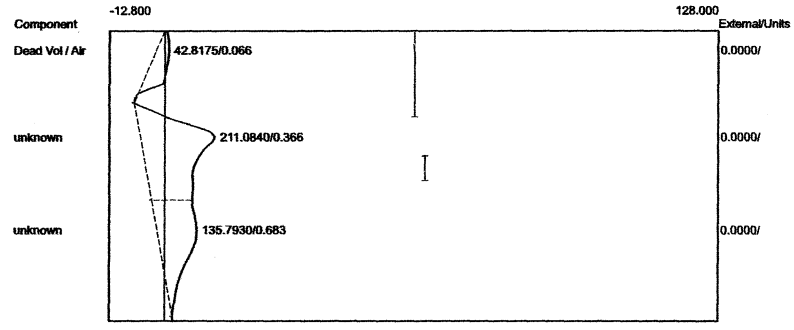
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	32.7740	0.0000	
		32.7740	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:15:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A04.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



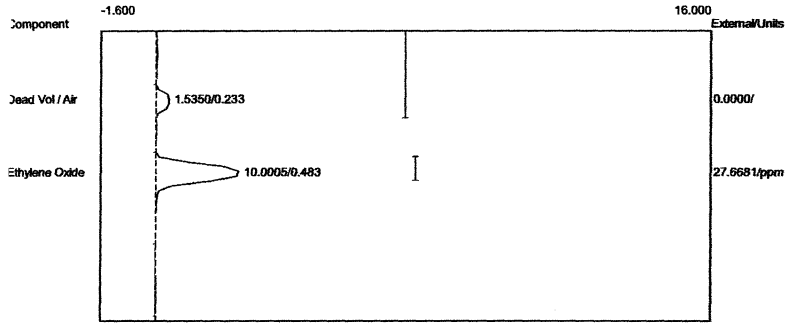
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.5150	0.0000	
Ethylene Oxide	0.483	10.2815	28.4455	ppm
		11.7965	28.4455	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:15:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A04.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



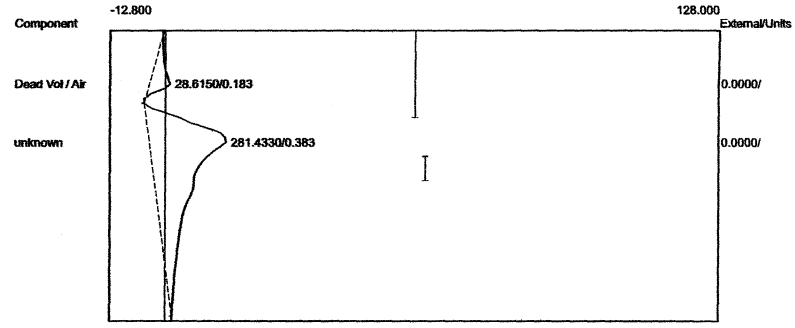
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	42.8175	0.0000	
		42.8175	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:20:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A05.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



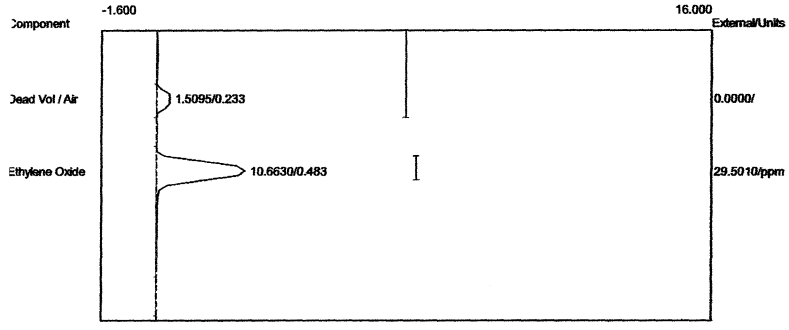
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.5350	0.0000	
Ethylene Oxide	0.483	10.0005	27.6681	ppm
		11.5355	27.6681	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:20:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A05.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



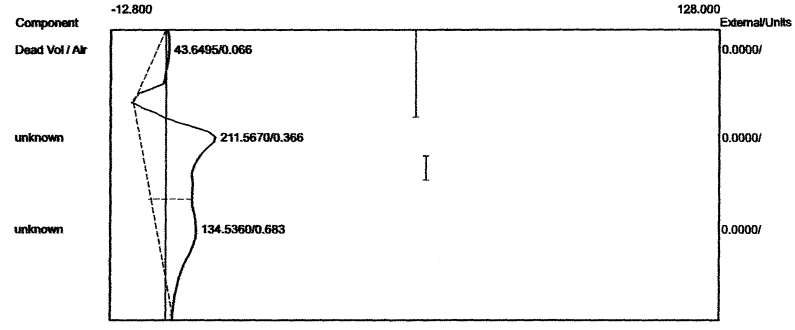
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	28.6150	0.0000	
		28.6150	0.0000	

Lab name: EOSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:25:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A06.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



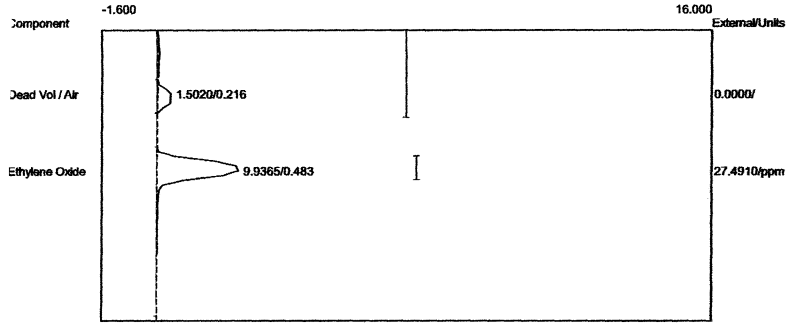
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.5095	0.0000	
Ethylene Oxide	0.483	10.6630	29.5010	ppm
		12.1725	29.5010	

Lab name: EOSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:25:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A06.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



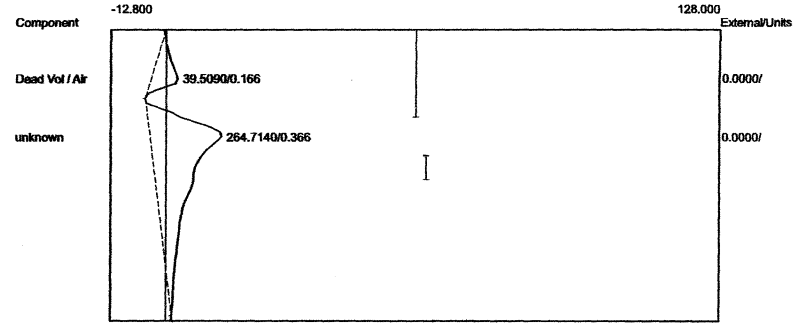
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	43.6495	0.0000	
		43.6495	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:30:08
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A07.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



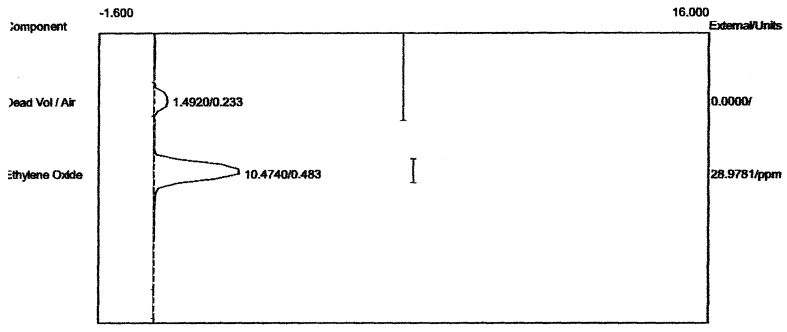
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.5020	0.0000	
Ethylene Oxide	0.483	9.9365	27.4910	ppm
		11.4385	27.4910	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:30:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A07.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



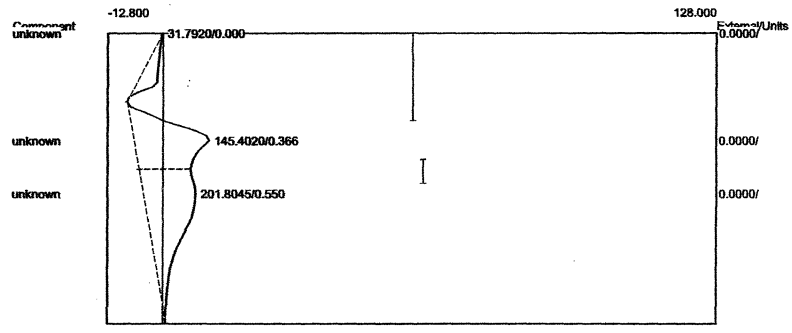
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	39.5090	0.0000	
		39.5090	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:35:20
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A08.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



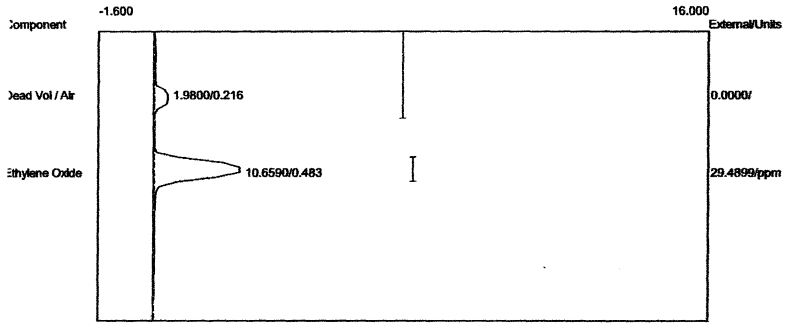
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4920	0.0000	
Ethylene Oxide	0.483	10.4740	28.9781	ppm
		11.9660	28.9781	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:35:20
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A08.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



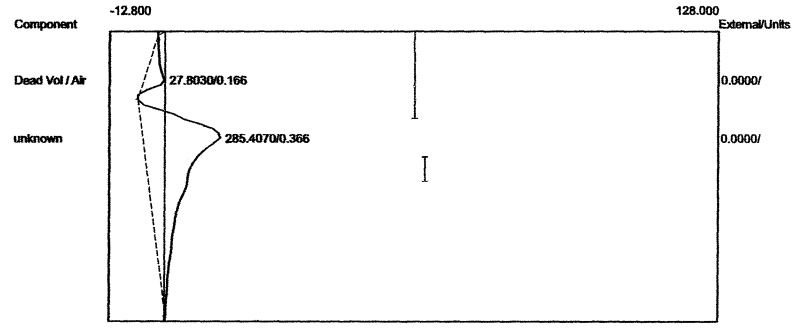
Component	Retention	Area	External	Units
		0.0000	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:40:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A09.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



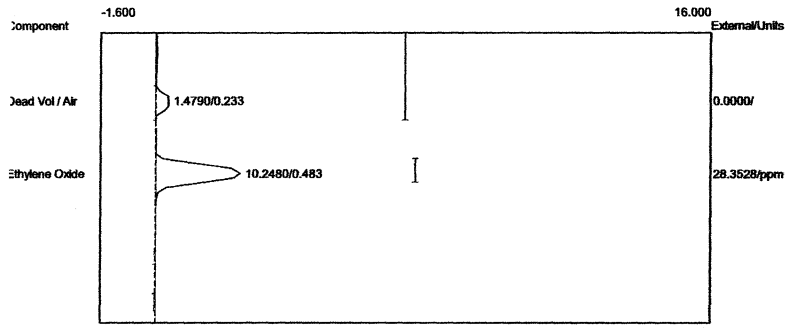
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.9800	0.0000	
Ethylene Oxide	0.483	10.6590	29.4899	ppm
		12.6390	29.4899	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:40:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A09.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



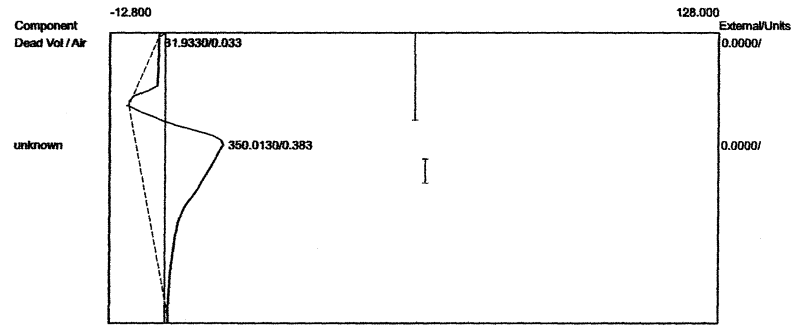
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	27.8030	0.0000	
		27.8030	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:45:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A10.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



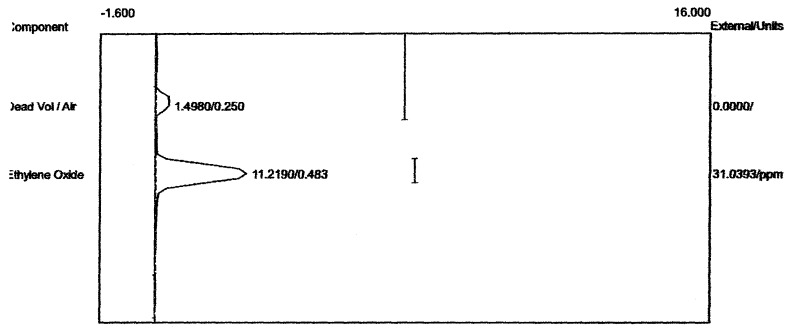
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4790	0.0000	
Ethylene Oxide	0.483	10.2480	28.3528	ppm
		11.7270	28.3528	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:45:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A10.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



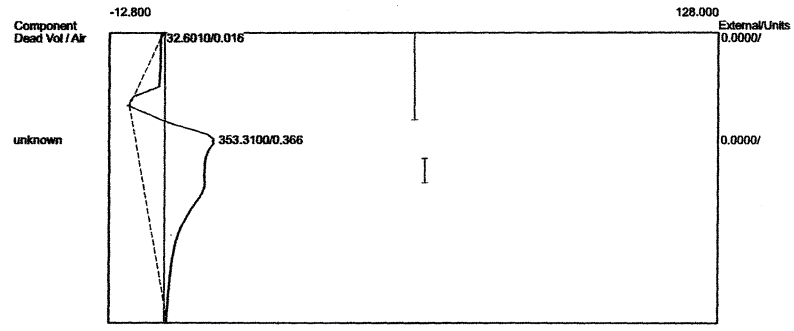
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	31.9330	0.0000	
		31.9330	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:50:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A11.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



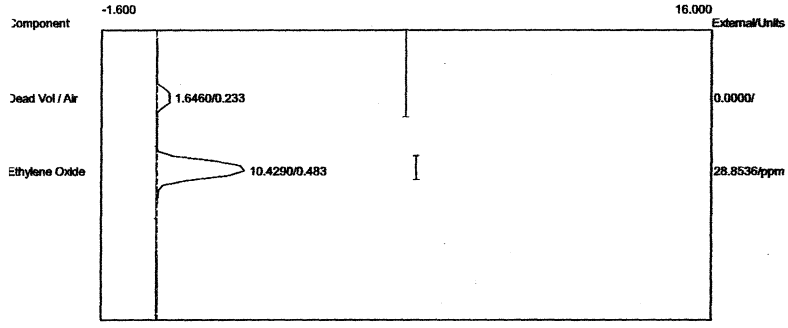
Component	Retention	Area	External	Units
Dead Vol / Air	0.250	1.4980	0.0000	
Ethylene Oxide	0.483	11.2190	31.0393	ppm
		12.7170	31.0393	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:50:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A11.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



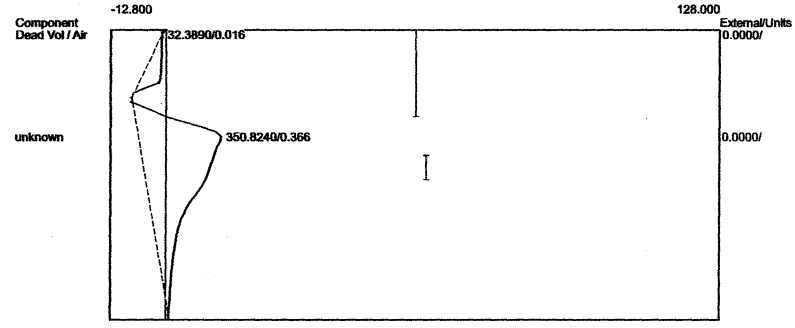
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	32.6010	0.0000	
		32.6010	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:55:16
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-1A12.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.6460	0.0000	
Ethylene Oxide	0.483	10.4290	28.8536	ppm
		12.0750	28.8536	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#1Aer
Analysis date: 09/27/2018 09:55:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-1A12.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer

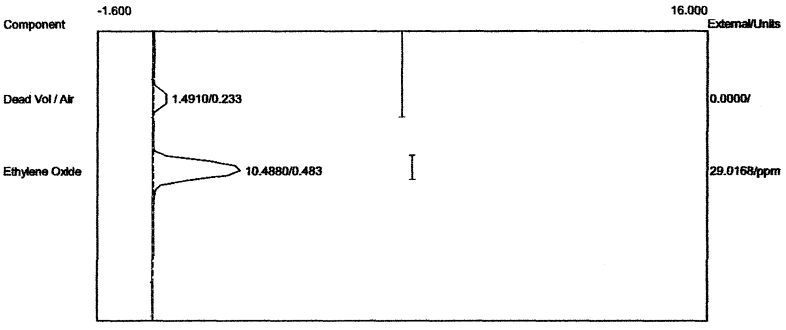


Component	Retention	Area	External	Units
Dead Vol / Air	0.016	32.3890	0.0000	
		32.3890	0.0000	

APPENDIX C

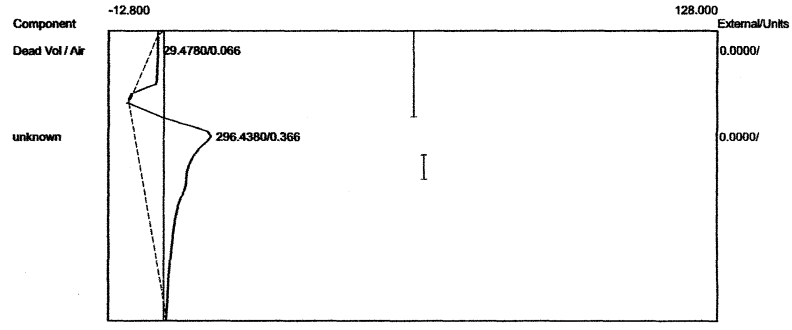
Run#2 Chromatograms

Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:00:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A01.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



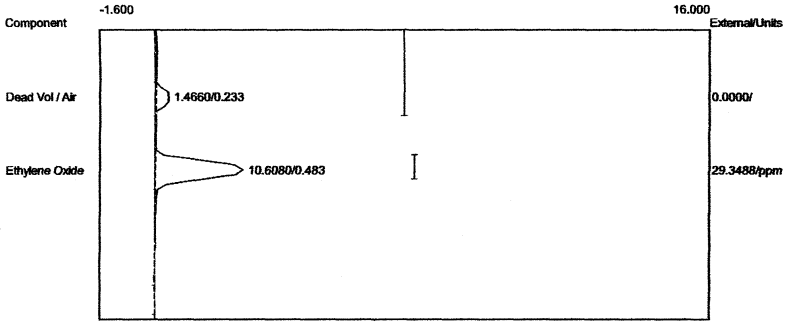
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4910	0.0000	
Ethylene Oxide	0.483	10.4880	29.0168	ppm
		11.9790	29.0168	

Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:00:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A01.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



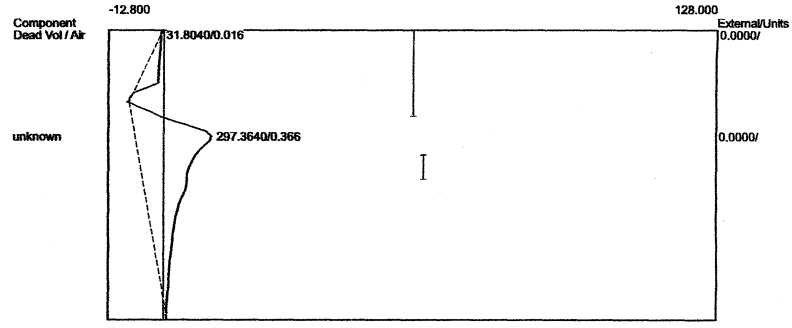
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	29.4780	0.0000	
		29.4780	0.0000	

Lab name: ESSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:05:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A02.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



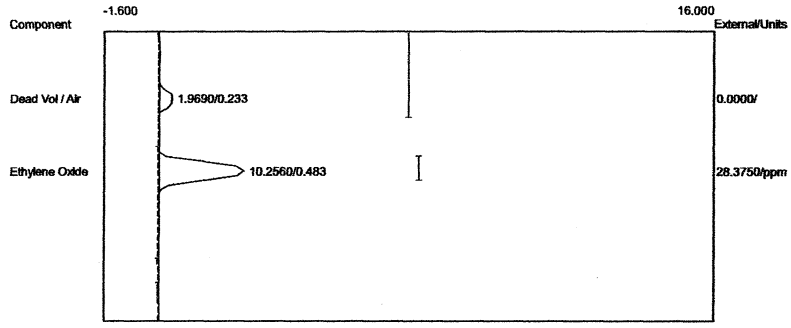
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4660	0.0000	
Ethylene Oxide	0.483	10.6080	29.3488	ppm
		12.0740	29.3488	

Lab name: ESSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:05:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A02.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



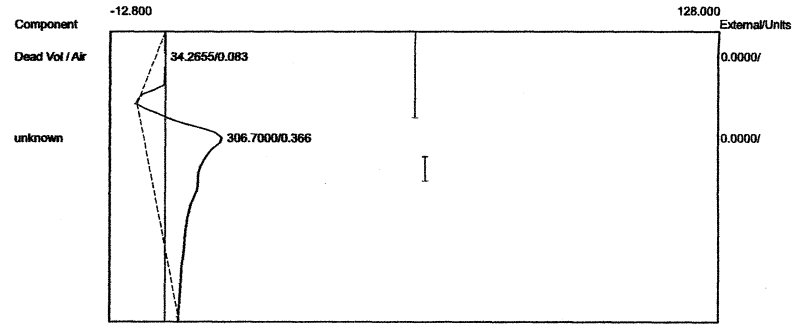
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	31.8040	0.0000	
		31.8040	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:10:09
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A03.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



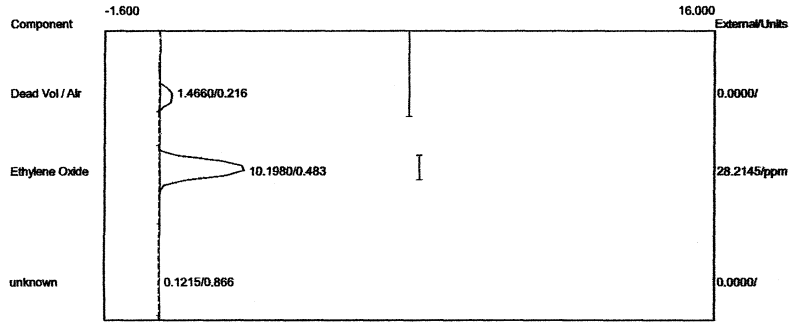
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.9690	0.0000	
Ethylene Oxide	0.483	10.2560	28.3750	ppm
		12.2250	28.3750	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:10:09
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A03.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



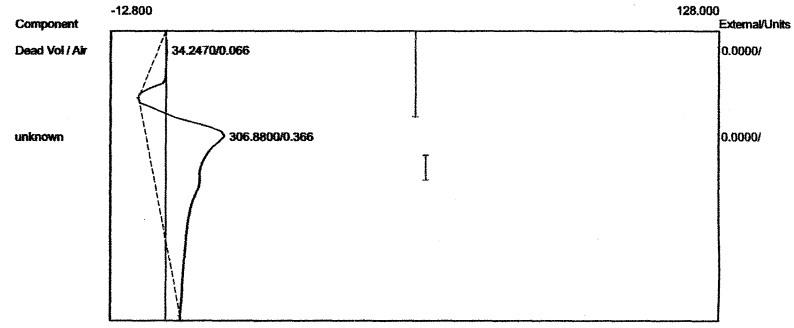
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	34.2655	0.0000	
		34.2655	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:15:08
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A04.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



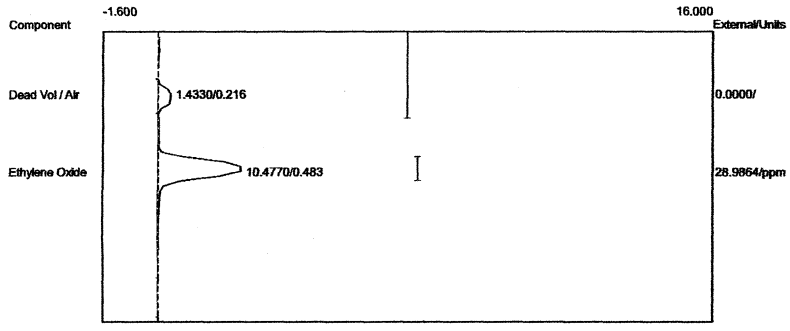
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4660	0.0000	
Ethylene Oxide	0.483	10.1980	28.2145	ppm
		11.6640	28.2145	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:15:08
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A04.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



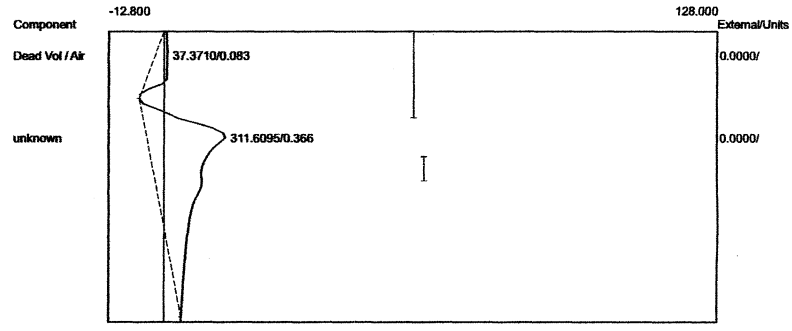
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	34.2470	0.0000	
		34.2470	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:20:41
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A05.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



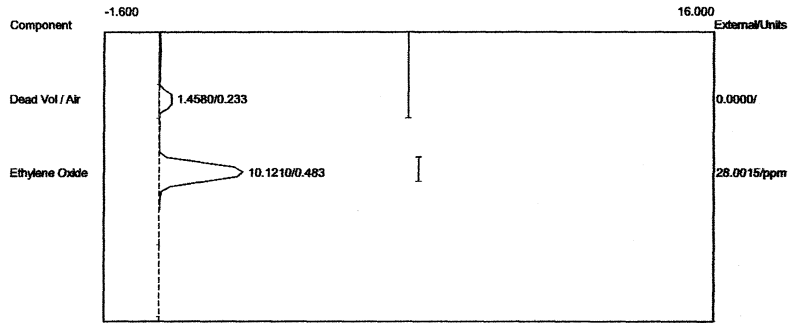
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4330	0.0000	
Ethylene Oxide	0.483	10.4770	28.9864	ppm
		11.9100	28.9864	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:20:41
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A05.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



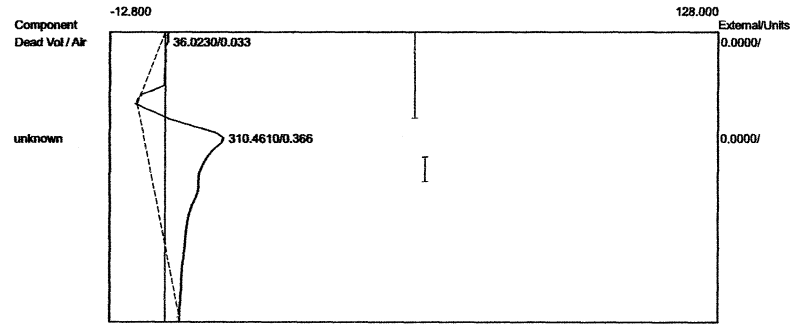
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	37.3710	0.0000	
		37.3710	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:25:34
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A06.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



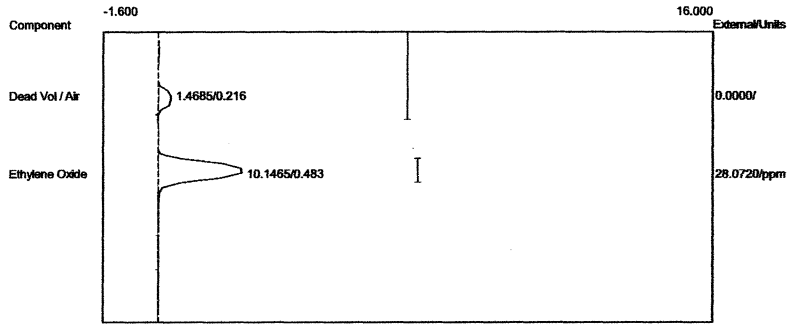
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4580	0.0000	
Ethylene Oxide	0.483	10.1210	28.0015	ppm
		11.5790	28.0015	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:25:34
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A06.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



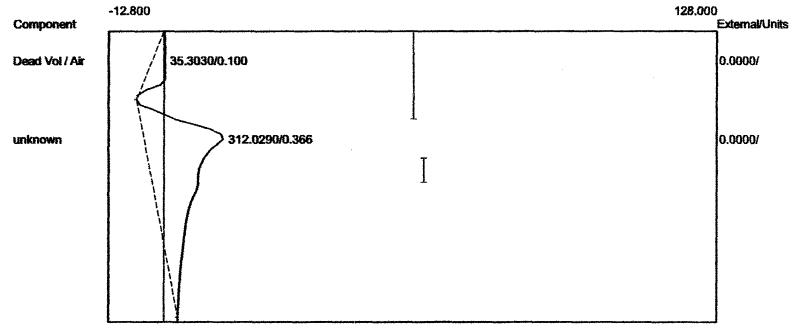
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	36.0230	0.0000	
		36.0230	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:30:01
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A07.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



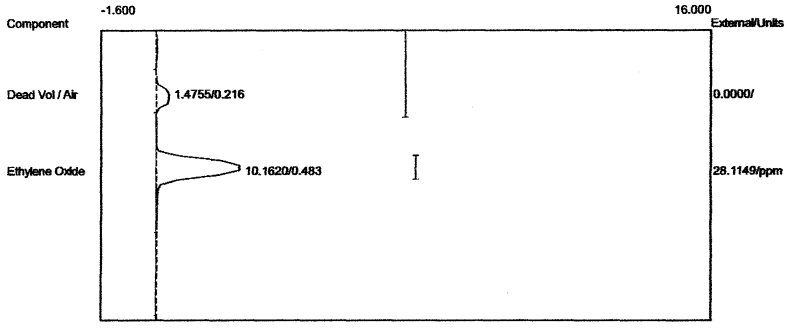
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4685	0.0000	
Ethylene Oxide	0.483	10.1465	28.0720	ppm
		11.6150	28.0720	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:30:01
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A07.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



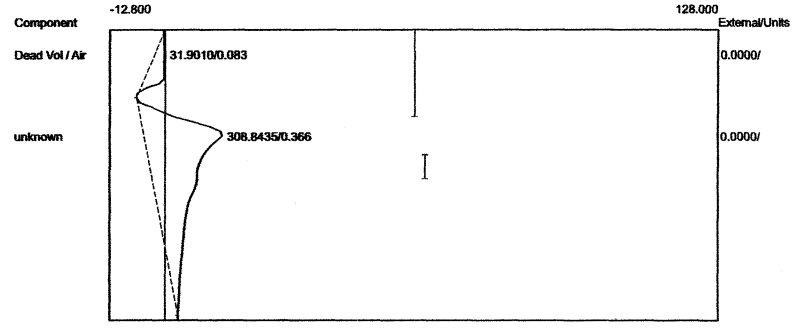
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	35.3030	0.0000	
		35.3030	0.0000	

Lab name: EOSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:35:44
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A08.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



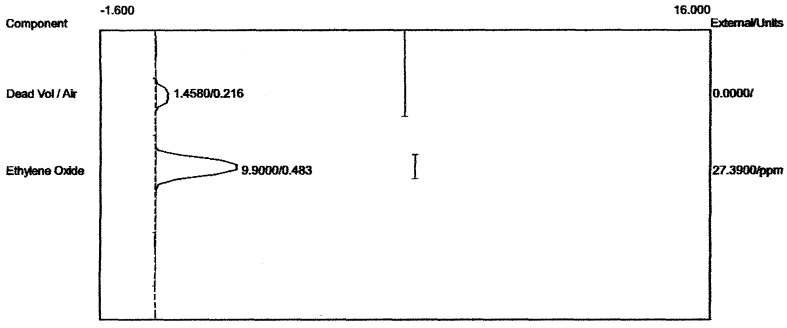
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4755	0.0000	
Ethylene Oxide	0.483	10.1620	28.1149	ppm
		11.6375	28.1149	

Lab name: EOSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:35:44
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A08.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



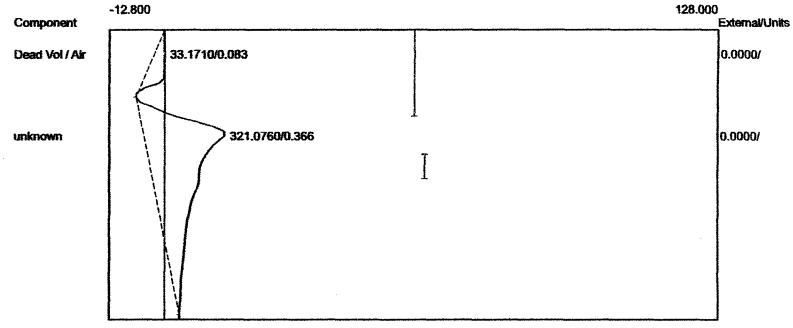
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	31.9010	0.0000	
		31.9010	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:40:48
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A09.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



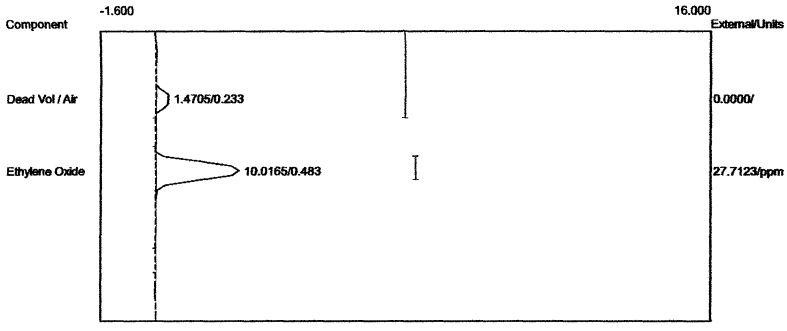
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4580	0.0000	
Ethylene Oxide	0.483	9.9000	27.3900	ppm
		11.3580	27.3900	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:40:48
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A09.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



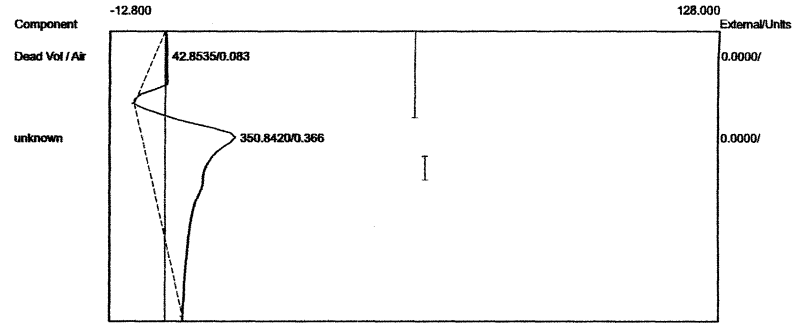
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	33.1710	0.0000	
		33.1710	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:45:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A10.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



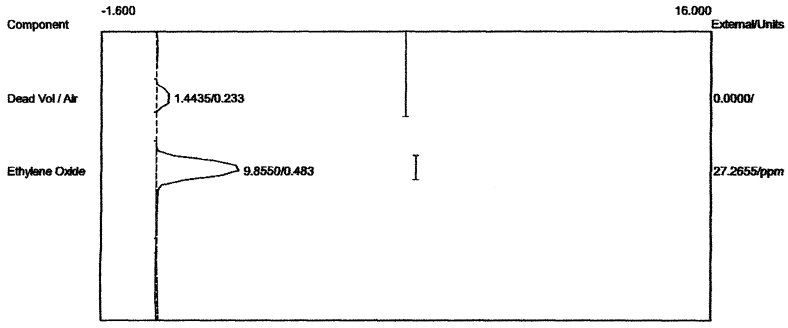
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4705	0.0000	
Ethylene Oxide	0.483	10.0165	27.7123	ppm
		11.4870	27.7123	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:45:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A10.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



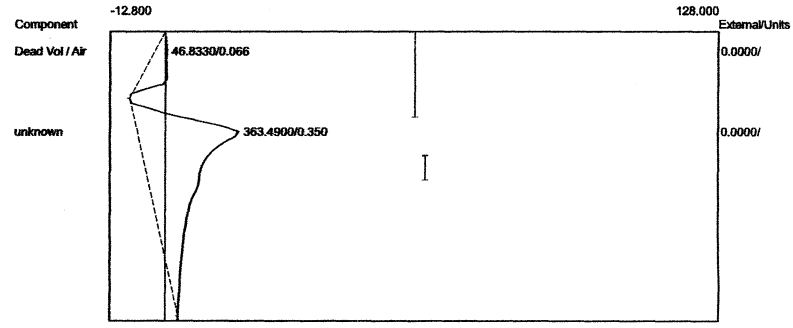
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	42.8535	0.0000	
		42.8535	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:50:11
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A11.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



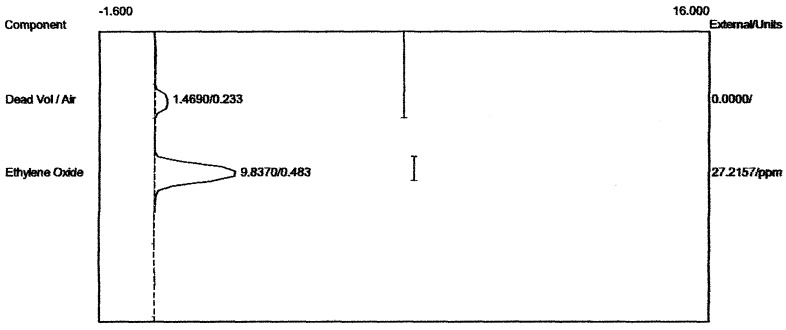
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4435	0.0000	
Ethylene Oxide	0.483	9.8550	27.2655	ppm
		11.2985	27.2655	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:50:11
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A11.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



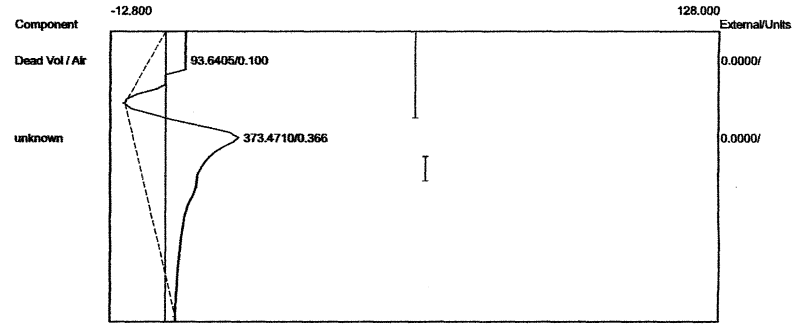
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	46.8330	0.0000	
		46.8330	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:55:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-2A12.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4690	0.0000	
Ethylene Oxide	0.483	9.8370	27.2157	ppm
		11.3060	27.2157	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#2Aer
Analysis date: 09/27/2018 10:55:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-2A12.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer

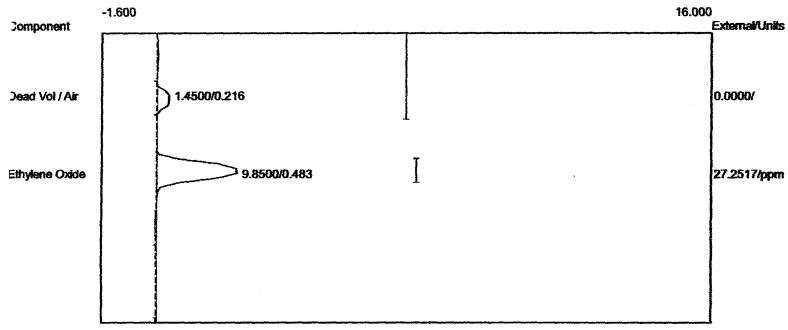


Component	Retention	Area	External	Units
Dead Vol / Air	0.100	93.6405	0.0000	
		93.6405	0.0000	

APPENDIX D

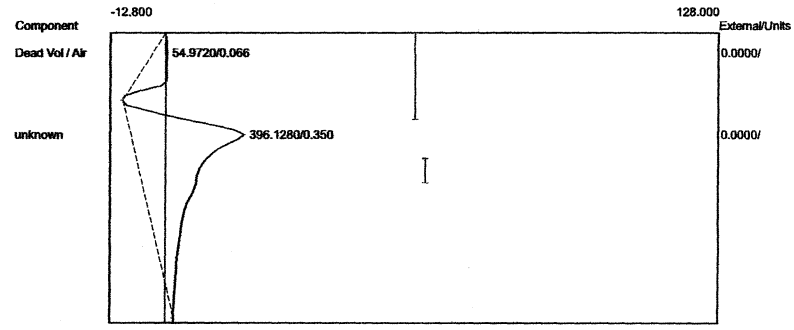
Run#3 Chromatograms

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:00:07
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A01.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



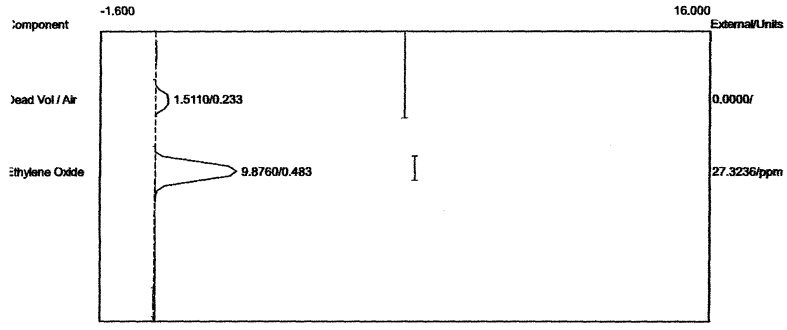
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4500	0.0000	
Ethylene Oxide	0.483	9.8500	27.2517	ppm
		11.3000	27.2517	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:00:07
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A01.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



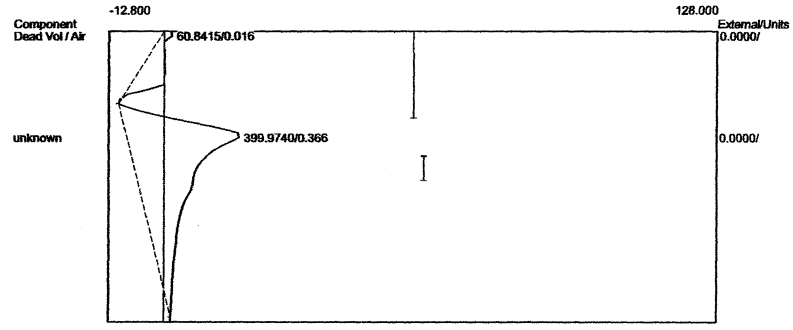
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	54.9720	0.0000	
		54.9720	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:05:06
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A02.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



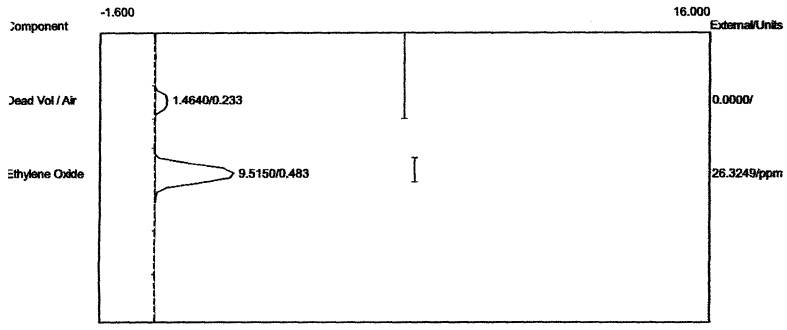
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.5110	0.0000	
Ethylene Oxide	0.483	9.8760	27.3236	ppm
		11.3870	27.3236	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:05:06
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A02.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



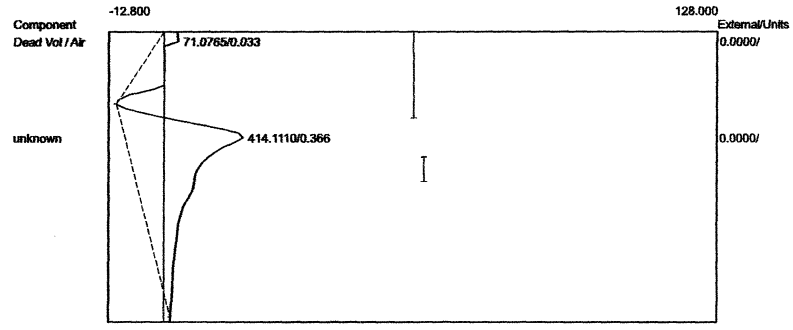
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	60.8415	0.0000	
		60.8415	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:10:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A03.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



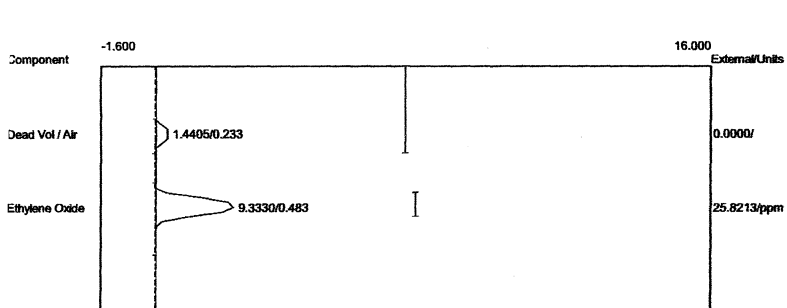
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4640	0.0000	
Ethylene Oxide	0.483	9.5150	26.3249	ppm
		10.9790	26.3249	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:10:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A03.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



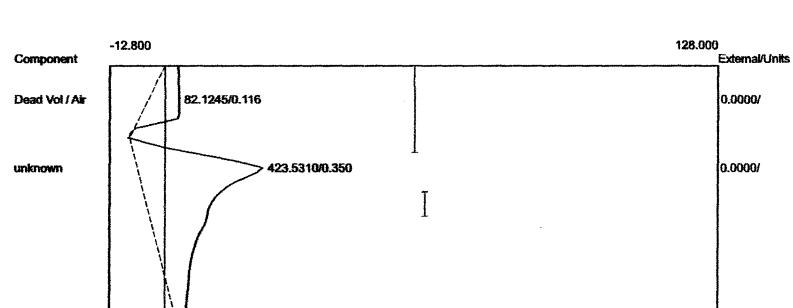
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	71.0765	0.0000	
		71.0765	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:15:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A04.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



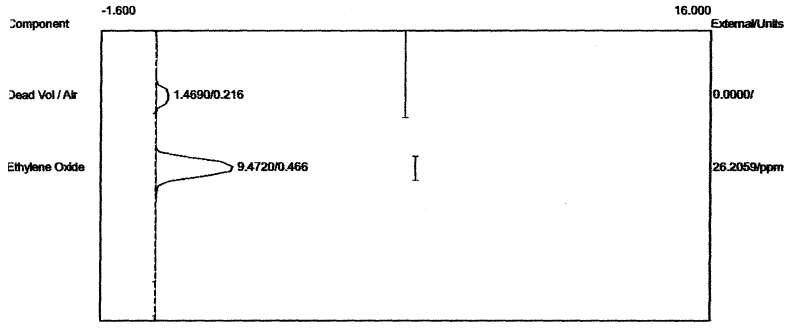
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4405	0.0000	
Ethylene Oxide	0.483	9.3330	25.8213	ppm
		10.7735	25.8213	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:15:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A04.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



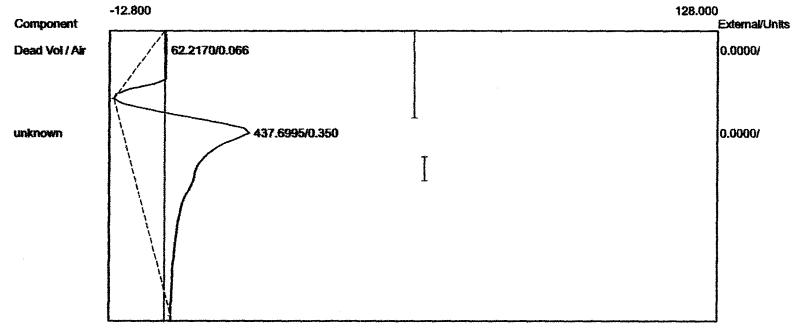
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	82.1245	0.0000	
		82.1245	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:20:42
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A05.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



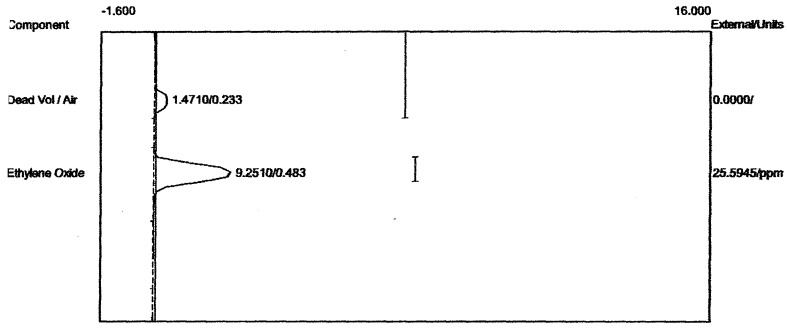
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4690	0.0000	
Ethylene Oxide	0.466	9.4720	26.2059	ppm
		10.9410	26.2059	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:20:42
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A05.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



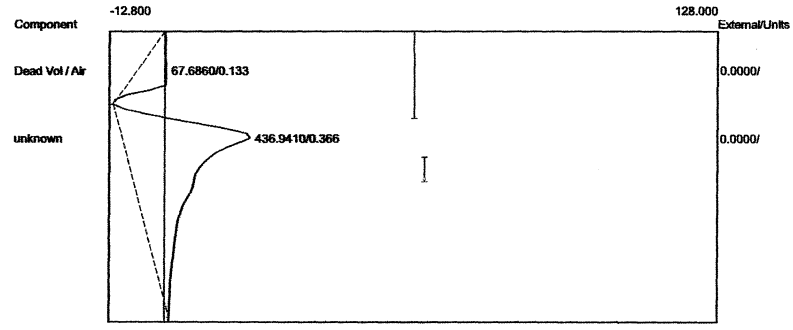
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	62.2170	0.0000	
		62.2170	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:25:05
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A06.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



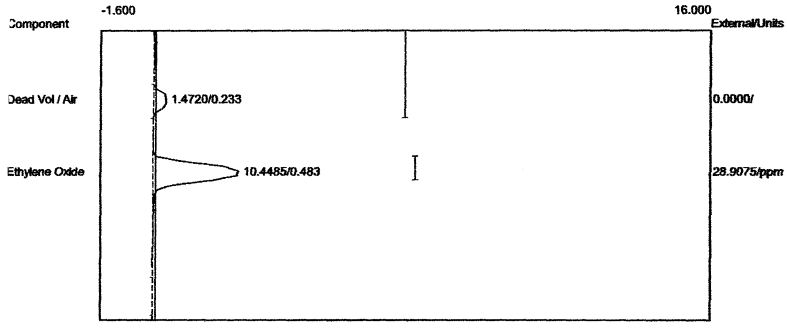
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4710	0.0000	
Ethylene Oxide	0.483	9.2510	25.5945	ppm
		10.7220	25.5945	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:25:05
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A06.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



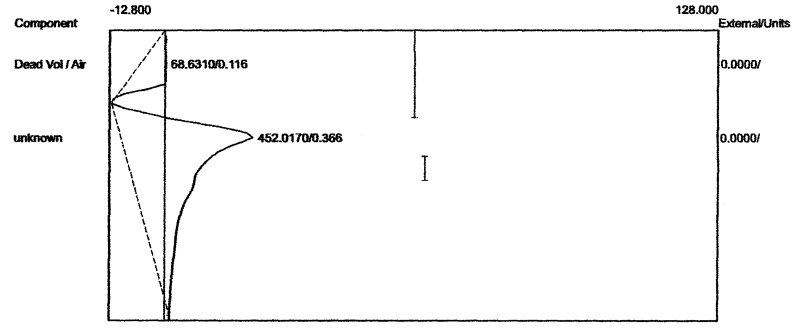
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	67.6860	0.0000	
		67.6860	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:30:41
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A07.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



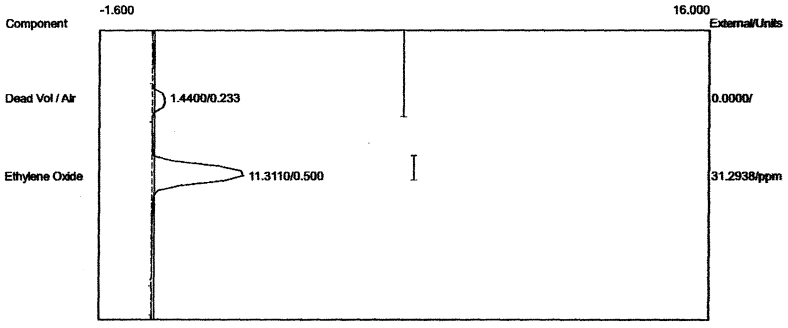
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4720	0.0000	
Ethylene Oxide	0.483	10.4485	28.9075	ppm
		11.9205	28.9075	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:30:41
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A07.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



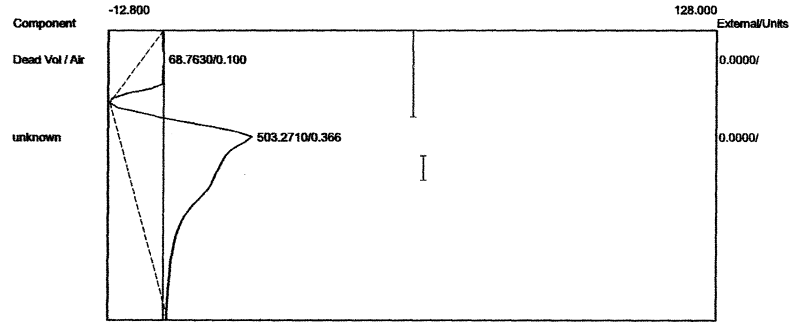
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	68.6310	0.0000	
		68.6310	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:35:18
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A08.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



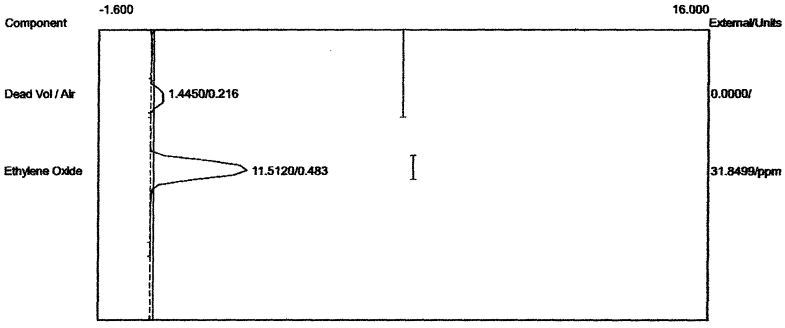
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4400	0.0000	
Ethylene Oxide	0.500	11.3110	31.2938	ppm
		12.7510	31.2938	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:35:18
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A08.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



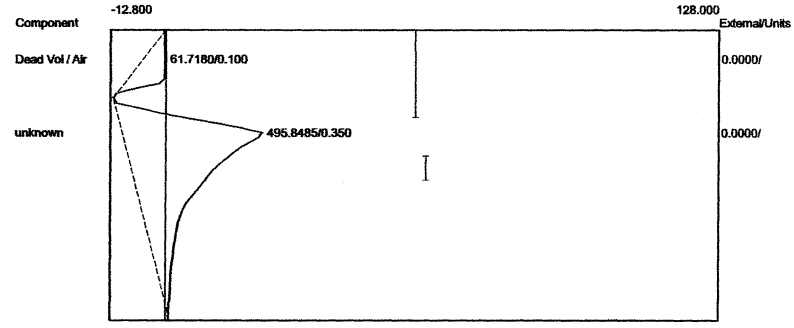
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	68.7630	0.0000	
		68.7630	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:40:19
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A09.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



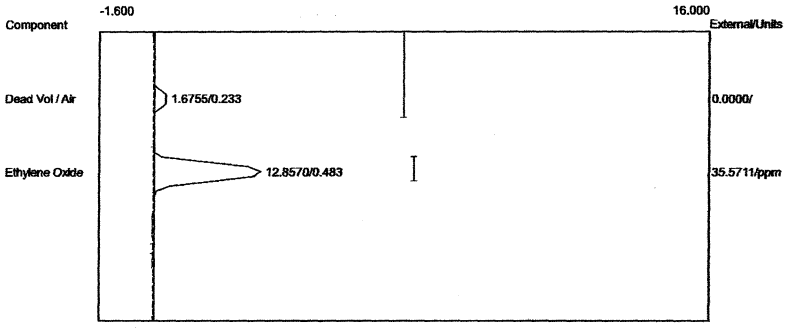
Component	Retention	Area	External	Units
Dead Vol / Air	0.216	1.4450	0.0000	
Ethylene Oxide	0.483	11.5120	31.8499	ppm
		12.9570	31.8499	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:40:19
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A09.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



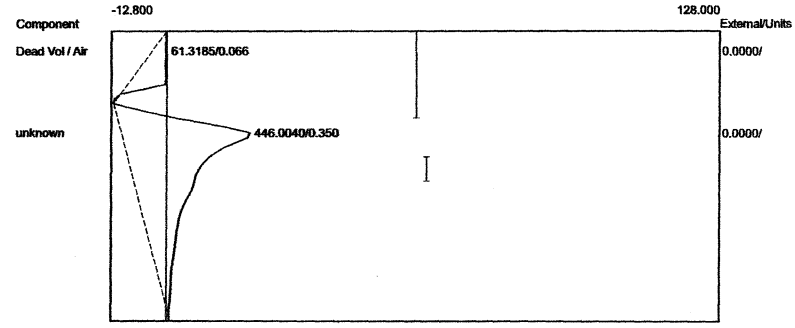
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	61.7180	0.0000	
		61.7180	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:45:16
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A10.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



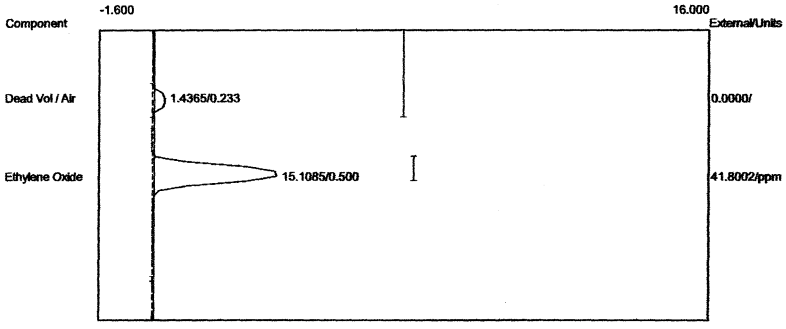
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.6755	0.0000	
Ethylene Oxide	0.483	12.8570	35.5711	ppm
		14.5325	35.5711	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:45:16
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A10.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



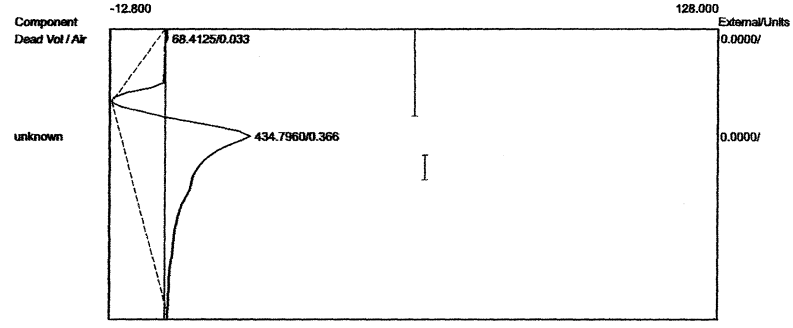
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	61.3185	0.0000	
		61.3185	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:50:15
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A11.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



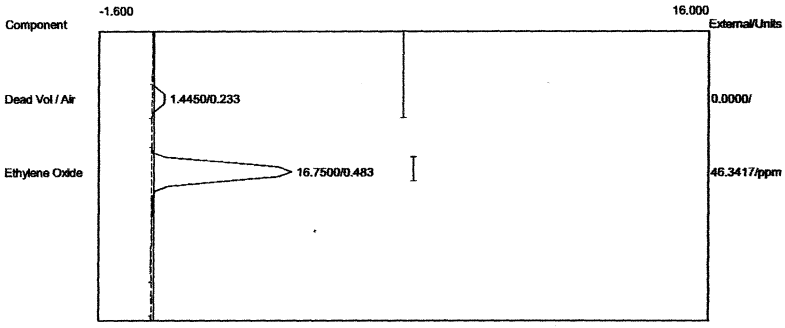
Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4365	0.0000	
Ethylene Oxide	0.500	15.1085	41.8002	ppm
		16.5450	41.8002	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:50:15
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A11.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



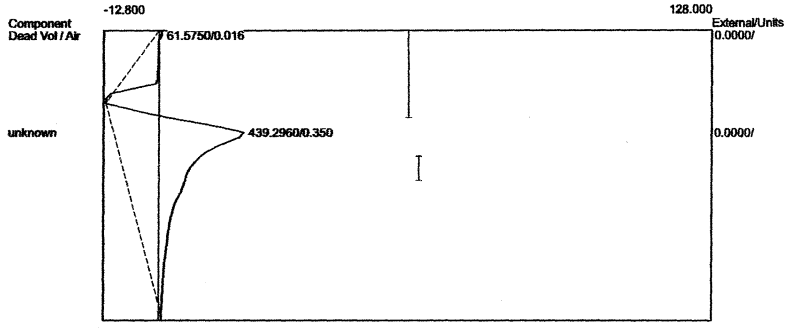
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	68.4125	0.0000	
		68.4125	0.0000	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:55:14
Method: Direct Injection
Description: CHANNEL 1 - FID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto1-100.cpt
Data file: 1SterWB2018-3A12.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.233	1.4450	0.0000	
Ethylene Oxide	0.483	16.7500	46.3417	ppm
		18.1950	46.3417	

Lab name: ECSI
Client: Sterigenics - Salt Lake City
Client ID: Run#3Aer
Analysis date: 09/27/2018 11:55:14
Method: Direct Injection
Description: CHANNEL 2 - PID
Column: 1% SP-1000, Carbopack B
Carrier: HELIUM
Temp. prog: eto-100.tem
Components: eto2-100.cpt
Data file: 2SterSLC2018-3A12.CHR (c:\peak359)
Sample: AAT Outlet
Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	61.5750	0.0000	
		61.5750	0.0000	

APPENDIX E

Field Data and Calculation Worksheets

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations - Aeration

Sterigenics, Inc. - Salt Lake City, Utah - September 27, 2018
AAT Safe Cell System Inlet

DeltaP	SqRtDeltaP	Temp (F)	ppm EtO
	Run #1		
0.26	0.5099	104	29.8
0.26	0.5099	104	29.9
0.26	0.5099	104	31.0
0.26	0.5099	104	28.4
0.26	0.5099	104	27.7
0.26	0.5099	104	29.5
0.26	0.5099	104	27.5
0.26	0.5099	104	29.0
0.26	0.5099	104	29.5
0.26	0.5099	104	28.4
0.26	0.5099	104	31.0
0.26	0.5099	104	28.9
	Run #2		
0.26	0.5099	104	29.0
0.26	0.5099	104	29.3
0.26	0.5099	104	28.4
0.26	0.5099	104	28.2
0.26	0.5099	104	29.0
0.26	0.5099	104	28.0
0.26	0.5099	104	28.1
0.26	0.5099	104	28.1
0.26	0.5099	104	27.4
0.26	0.5099	104	27.7
0.26	0.5099	104	27.3
0.26	0.5099	104	27.2
	Run #3		
0.26	0.5099	104	27.3
0.26	0.5099	104	27.3
0.26	0.5099	104	26.3
0.26	0.5099	104	25.8
0.26	0.5099	104	26.2
0.26	0.5099	104	25.6
0.26	0.5099	104	28.9
0.26	0.5099	104	31.3
0.26	0.5099	104	31.8
0.26	0.5099	104	35.6
0.26	0.5099	104	41.8
0.26	0.5099	104	46.30
Average =			
0.26	0.5099	104.0	**29.51**
	=	564	degR

stack ID =	32	in.
stack area =	5.585	sq. in.
press =	25.85	in. Hg
Tstd =	528	deg R
Pstd =	29.92	in Hg
Cp =	0.99	
Kp =	85.49	
Velocity =	37.4	ft/sec
Flow =	**9943**	**dscfm**
MWeto =	44.05	
MolVol =	385.32	
ppmv/ft3 =	1000000	
EtO Mass Flow =	**0.033547**	**lbs/min**
EtO Mass Flow =	**2.012839**	**lbs/hr**

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations - Aeration

Sterigenics, Inc. - Salt Lake City, Utah - September 27, 2018
AAT Safe Cell System Outlet

DeltaP	SqRtDeltaP	Temp (F)	ppm EtO
	Run #1		
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
	Run #2		
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
	Run #3		
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
0.25	0.5000	87	0.08
Average =			
0.25	0.5000	87.0	**0.0800**
	=	547	degR

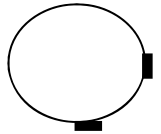
stack ID =	32	in.
stack area =	5.585	sq. in.
press =	25.85	in. Hg
Tstd =	528	deg R
Pstd =	29.92	in Hg
Cp =	0.99	
Kp =	85.49	
Velocity =	36.1	ft/sec
Flow =	**9900**	**dscfm**
MWeto =	44.05	
MolVol =	385.32	
ppmv/ft3 =	1000000	
EtO Mass Flow =	**0.000091**	**lbs/min**
EtO Mass Flow =	**0.005433**	**lbs/hr**

ECSI, INC. - VELOCITY TRAVERSE DATA

Client: Sterigenics, Inc. Run #: 1 Date: 9/27/2018 Port Sketch:

Location: Salt Lake City, UT Plant Probe Type: S type Baro Press: 25.85

Source: AAT Safe Cell System Inlet Stack I.D.: 32 in. DSCFM: **9890**



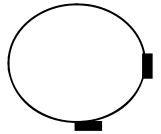
	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.7	1	0.34	0.34	0.34	0.5831	104	2.3	1	0.33	0.33	0.33	0.5745	104	2.2
2.1	2	0.32	0.32	0.32	0.5657	104	1.8	2	0.3	0.3	0.3	0.5477	104	2.4
3.7	3	0.3	0.3	0.3	0.5477	104	3.2	3	0.28	0.28	0.28	0.5292	104	1.8
5.7	4	0.28	0.28	0.28	0.5292	104	3.0	4	0.26	0.26	0.26	0.5099	104	1.6
8.0	5	0.26	0.26	0.26	0.5099	104	2.4	5	0.26	0.26	0.26	0.5099	104	2.6
11.4	6	0.25	0.25	0.25	0.5000	104	2.2	6	0.25	0.25	0.25	0.5000	104	3.0
21.6	7	0.25	0.25	0.25	0.5000	104	2.2	7	0.25	0.25	0.25	0.5000	104	3.6
24.0	8	0.25	0.25	0.25	0.5000	104	2.6	8	0.25	0.25	0.25	0.5000	104	2.8
26.3	9	0.23	0.23	0.23	0.4796	104	3.0	9	0.25	0.25	0.25	0.5000	104	2.2
28.3	10	0.23	0.23	0.23	0.4796	104	3.2	10	0.23	0.23	0.23	0.4796	104	2.4
29.9	11	0.22	0.22	0.22	0.4690	104	2.1	11	0.21	0.21	0.21	0.4583	104	2.0
31.3	12	0.2	0.2	0.2	0.4472	104	2.0	12	0.2	0.2	0.2	0.4472	104	1.8
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
											Average Values:	0.2583	0.5070	104.0	2.4

ECSI, INC. - VELOCITY TRAVERSE DATA

Client: Sterigenics, Inc. Run #: 1 Date: 9/27/2018 Port Sketch:

Location: Salt Lake City, UT Plant Probe Type: S type Baro Press: 25.85

Source: AAT Safe Cell System Outlet Stack I.D.: 32 in. DSCFM: **10,000**



	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.7	1	0.2	0.2	0.2	0.4472	89	2.0	1	0.18	0.18	0.18	0.4243	89	1.4
2.1	2	0.22	0.22	0.22	0.4690	89	3.4	2	0.2	0.2	0.2	0.4472	89	2.8
3.7	3	0.22	0.22	0.22	0.4690	89	5.2	3	0.23	0.23	0.23	0.4796	89	3.2
5.7	4	0.23	0.23	0.23	0.4796	89	4.2	4	0.25	0.25	0.25	0.5000	89	4.3
8.0	5	0.25	0.25	0.25	0.5000	89	4.4	5	0.24	0.24	0.24	0.4899	89	5.1
11.4	6	0.25	0.25	0.25	0.5000	89	1.8	6	0.25	0.25	0.25	0.5000	89	4.0
21.6	7	0.25	0.25	0.25	0.5000	89	2.6	7	0.26	0.26	0.26	0.5099	89	3.8
24.0	8	0.26	0.26	0.26	0.5099	89	3.0	8	0.26	0.26	0.26	0.5099	89	3.3
26.3	9	0.28	0.28	0.28	0.5292	89	3.4	9	0.27	0.27	0.27	0.5196	89	3.6
28.3	10	0.3	0.3	0.3	0.5477	89	4.6	10	0.28	0.28	0.28	0.5292	89	4.5
29.9	11	0.34	0.34	0.34	0.5831	89	4.8	11	0.3	0.3	0.3	0.5477	89	4.1
31.3	12	0.36	0.36	0.36	0.6000	89	3.1	12	0.31	0.31	0.31	0.5568	89	2.2
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
									Average Values:		0.2579	0.5062	89.0	3.5

ETHYLENE OXIDE SOURCE TEST/CALIBRATION DATA

Client: Steriqenics - SLC

Source Tested: AAT Safe Cell System Date: 9/27/18

PRE CALIBRATION

	Calibration Gas Conc. (ppmv)	1.10 ppm EtO	10.1 ppm EtO	100 ppm EtO	1000 ppm EtO	10080 ppm EtO			
Inlet (FID)	Area Counts #1	.361	3.35	32.3					
	Area Counts #2/3	.354 / .361	3.35 / 3.32	32.0 / 32.4					
	Average Area	.3587	3.340	32.23			Sample Line Bias Calibration		
1.10 ppm	Audit Standard (48.8 ppmv) Result					49.0	99.3		(Std @100 ppmv)
4 3.74 5 3.73	Calibration Gas Conc. (ppmv)	1.10 ppm EtO	10.1 ppm EtO	100 ppm EtO					
Outlet (PID)	Area Counts #1	3.74	35.9	345					
	Area Counts #2/3	3.70 / 3.73	35.2 / 35.3	343 / 347					
6 3.72	Average Area	3.730	35.47	345.0			Sample Line Bias Calibration		
7 3.73	Audit Standard (48.8 ppmv) Result					49.1	10.3		(Std @10.1 ppmv)

	Run #1	Run #2	Run #3				
Aer. Start:	858	958	1058	P_{bar}:	25.85	EtO Usage (lbs/yr):	–
Aer. Stop:	958	1058	1158	$\%H_2O$:		Cycles Per Week:	–

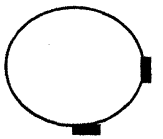
MID/POST CALIBRATION

	Calibration Gas Conc. (ppmv)	1.10 ppm EtO	10.1 ppm EtO	100 ppm EtO	1000 ppm EtO	10080 ppm EtO			
Inlet (FID)	Mid Cal								
	Post Cal			33.0 = 101		ppm	✓		
	Audit Standard (48.8 ppmv) Result								
	Calibration Gas Conc. (ppmv)	1.10 ppm EtO	10.1 ppm EtO	100 ppm EtO					
Outlet (PID)	Mid Cal								
	Post Cal		35.2 = 10.2		ppm	✓			
	Audit Standard (48.8 ppmv) Result								

ECSi

ECSI, INC. - VELOCITY TRAVERSE DATA

Client: Sterigenics, Inc. Run #: 1 Date: 9/27/2018 Port Sketch:



Location: Salt Lake City, UT Plant Probe Type: S type Baro Press: 25.85

Source: AAT Safe Cell System ~~Outlet~~ Inlet Stack I.D.: 32 in. DSCFM: 9890

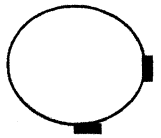
	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.7	1	.34	.34	#DIV/0!	#DIV/0!	104	2.3	1	.33	.33	#DIV/0!	#DIV/0!	104	2.2
2.1	2	.32	.32	#DIV/0!	#DIV/0!	104	1.8	2	.3	.3	#DIV/0!	#DIV/0!	104	2.4
3.7	3	.3	.3	#DIV/0!	#DIV/0!	104	3.2	3	.28	.28	#DIV/0!	#DIV/0!	104	1.8
5.7	4	.28	.28	#DIV/0!	#DIV/0!	104	3.0	4	.26	.26	#DIV/0!	#DIV/0!	104	1.6
8.0	5	.26	.26	#DIV/0!	#DIV/0!	104	2.4	5	.26	.26	#DIV/0!	#DIV/0!	104	2.6
11.4	6	.25	.25	#DIV/0!	#DIV/0!	104	2.2	6	.25	.25	#DIV/0!	#DIV/0!	104	3.0
21.6	7	.25	.25	#DIV/0!	#DIV/0!	104	2.2	7	.25	.25	#DIV/0!	#DIV/0!	104	3.6
24.0	8	.25	.25	#DIV/0!	#DIV/0!	104	2.6	8	.25	.25	#DIV/0!	#DIV/0!	104	2.8
26.3	9	.23	.23	#DIV/0!	#DIV/0!	104	3.0	9	.25	.25	#DIV/0!	#DIV/0!	104	2.2
28.3	10	.23	.23	#DIV/0!	#DIV/0!	104	3.2	10	.23	.23	#DIV/0!	#DIV/0!	104	2.4
29.9	11	.22	.22	#DIV/0!	#DIV/0!	104	2.1	11	.21	.21	#DIV/0!	#DIV/0!	104	2.0
31.3	12	.2	.2	#DIV/0!	#DIV/0!	104	2.0	12	.2	.2	#DIV/0!	#DIV/0!	104	1.8
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
								Average Values:			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

*Stack static pressure measured @ -0.25" H_2O

*Pitot tube P-4-2 was leak checked @ 2" H_2O, max scale on the manometer

ECSI, INC. - VELOCITY TRAVERSE DATA

Client: Sterigenics, Inc. Run #: 1 Date: 9/27/2018 Port Sketch:



Location: Salt Lake City, UT Plant Probe Type: S type Baro Press: 25.85

Source: AAT Safe Cell System ~~Inlet~~ Outlet Stack I.D.: 32 in. DSCFM: 10000

	Port 1							Port 2						
Inches From Port	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle	Point#	Delta P Low	Delta P High	Delta P Average	Delta P Sq Root	Stack Temp (F)	Cyclonic Angle
0.7	1	.2	.2	#DIV/0!	#DIV/0!	89	2.0	1	.18	.18	#DIV/0!	#DIV/0!	89	1.4
2.1	2	.22	.22	#DIV/0!	#DIV/0!	89	3.4	2	.2	.2	#DIV/0!	#DIV/0!	89	2.8
3.7	3	.22	.22	#DIV/0!	#DIV/0!	89	5.2	3	.23	.23	#DIV/0!	#DIV/0!	89	3.2
5.7	4	.23	.23	#DIV/0!	#DIV/0!	89	4.2	4	.25	.25	#DIV/0!	#DIV/0!	89	4.3
8.0	5	.25	.25	#DIV/0!	#DIV/0!	89	4.4	5	.24	.24	#DIV/0!	#DIV/0!	89	5.1
11.4	6	.25	.25	#DIV/0!	#DIV/0!	89	1.8	6	.25	.25	#DIV/0!	#DIV/0!	89	4.0
21.6	7	.25	.25	#DIV/0!	#DIV/0!	89	2.6	7	.26	.26	#DIV/0!	#DIV/0!	89	3.8
24.0	8	.26	.26	#DIV/0!	#DIV/0!	89	3.0	8	.26	.26	#DIV/0!	#DIV/0!	89	3.3
26.3	9	.28	.28	#DIV/0!	#DIV/0!	89	3.4	9	.27	.27	#DIV/0!	#DIV/0!	89	3.6
28.3	10	.3	.3	#DIV/0!	#DIV/0!	89	4.6	10	.28	.28	#DIV/0!	#DIV/0!	89	4.5
29.9	11	.34	.34	#DIV/0!	#DIV/0!	89	4.8	11	.3	.3	#DIV/0!	#DIV/0!	89	4.1
31.3	12	.36	.36	#DIV/0!	#DIV/0!	89	3.1	12	.31	.31	#DIV/0!	#DIV/0!	89	2.2
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
Average Values:											#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

* Stack static pressure measured at -0.25" H_2O

* Pitot tube P-4-2 was leak checked @ 2" H_2O, max scale on the manometer

APPENDIX F

Gas Certifications

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases
600 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-001
Item No.: 02020001310TCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CAL4448
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	1.10	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: MT DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)	Certified Concentration (Moles)	Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	1. PPM	1.10 PPM	10.0	5.00
NITROGEN	BAL	BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 1200 PSIG
Expiration Date: 20Apr2020

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases

00 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-003
Item No.: 02020001320TCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CLM003232
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	10.1	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: MT MT DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)		Certified Concentration (Moles)		Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	10.	PPM	10.1	PPM	1.0	5.00
NITROGEN		BAL		BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 1200 PSIG
Expiration Date: 20Apr2020

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases

2500 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-004
Item No.: 02020001330TCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CLM011385
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	100.	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: B. McCully BLM DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)		Certified Concentration (Moles)		Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	100.	PPM	100.	PPM	.0	5.00
NITROGEN		BAL		BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 1300 PSIG
Expiration Date: 20Apr2020

Valve Connection: CGA 350

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases

2300 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-005
Item No.: 0202000134OTCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CLM002810
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	1,000.	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: B. McCall BLM DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)		Certified Concentration (Moles)		Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	1,000.	PPM	1,000.	PPM	.0	5.00
NITROGEN		BAL		BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 1200 PSIG
Expiration Date: 20Apr2020

Valve Connection: CGA 350

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFIED WORKING CLASS

Single-Certified Calibration Standard

Scott Specialty Gases

2600 CAJON BLVD., SAN BERNARDINO, CA 92411 Phone: 909-887-2571 Fax: 909-887-0549

CERTIFICATE OF ACCURACY: Certified Working Class Calibration Standard

Product Information
Project No.: 02-57164-006
Item No.: 02020001340TCL
P.O. No.: VBL – D. KREMER

Cylinder Number: CLM005787
Cylinder Size: CL
Certification Date: 20Apr2018

Customer

ECSI, INC
PO BOX 1498
SAN CLEMENTE, CA 92674

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
ETHYLENE OXIDE	10,080.	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: B. McCully BLM DATE: 4-20-18

SPECIFICATIONS

Component Name	Requested Concentration (Moles)		Certified Concentration (Moles)		Blend Tolerance Result (+/- %)	Certified Accuracy Result (+/- %)
ETHYLENE OXIDE	10,000.	PPM	10,080.	PPM	.8	5.00
NITROGEN		BAL		BAL		

TRACEABILITY

Traceable To
Scott Reference Standard

PHYSICAL PROPERTIES

Cylinder Size: CL

Pressure: 700 PSIG
Expiration Date: 20Apr2020

Valve Connection: CGA 350

SPECIAL HANDLING INSTRUCTIONS

Do not use or store cylinder at or below the stated dew point temperature. Possible condensation of heavier components could result. In the event the cylinder has been exposed to temperatures at or below the dew point, place cylinder in heated area for 24 hours and then roll cylinder for 15 minutes to re-mix.

Use of calibration standards at or below dew point temperature may result in calibration error.

COMMENTS

CERTIFICATE OF ANALYSIS

Customer Name:	ECSi, Inc.	**Cylinder Number:**	SA25925
Stock or Analyzer Tag Number:	N/A	**Product Class:**	Certified Standard
Customer Reference:	Verbal- Dan	**Cylinder - Contents[1]:**	28 CF @ 2000 PSI
MESA Reference:	104448	**Cylinder-CGA:**	A006-HP-BR/350
Date of Certification:	4/19/2018	**Analysis Method:**	GC-TCD/FID
Recommended Shelf Life:	2 Years	**Preparation Method:**	Gravimetric

Component	Requested Concentration[2]	Reported Concentration[2,3]
Ethylene Oxide	50 ppm	48.8 ppm
Nitrogen	Balance	Balance

Authorized Signature:

1. The fill pressure shown on the COA is as originally quoted. The fill pressure measured by the customer may differ from the fill pressure originally quoted due to temperature effects, compressibility of the individual components when blended together in the cylinder, gauge accuracy or reduction in content volume before shipping as a result of samples withdrawn for laboratory QC necessary to ensure product quality.
2. Unless otherwise stated, concentrations are given in molar units.
3. Vapor pressure mixes are blended at a sufficiently low pressure so as to eliminate phase separation under most low temperature conditions encountered during transport or storage. However, it is generally recommended that cylinders containing vapor pressure restricted mixes be placed on the floor in a horizontal position and rolled back and forth to improve homogeneity of the gas phase mixture before being put into service.

Analytical Gas Standards are prepared and analyzed using combinations of NIST traceable weights, SRM's provided by NIST, or internal gas standards that have been verified for accuracy using procedures published by the US-EPA. Pure gases are analyzed and certified for purity using minor component Analytical Gas Standards prepared according to the methods specified above. Balances are calibrated to NIST test weights covered by NIST test number 822/256175/96. Reference Certification #'s: 163/W, 830/N and 3280. Calibration methods are in conformance with MIL-STD 45662A.

MESA Specialty Gases & Equipment
division of MESA International Technologies, Inc.
3619 Pendleton Avenue, Suite C ♦ Santa Ana, California 92704 ♦USA
TEL: 714-434-7102 ♦ FAX: 714-434-8006 ♦ E-mail: mail@mesagas.com
On-line Catalog at www.mesagas.com

APPENDIX G

Parametric Monitoring Data

TIME

~~Date~~	Reading	Ints.
8:35 2/25/2013	2.5	
1500	2.3	
1600	2.3	
1700	2.2	
1800	2.1	
1 used ~~1800~~ 1850	2.1	
2000	2.1	
2100	2.1	
2200	2.1	
2300	2.1	
2300	2.1	
75 used 0005	2.1	
0100	2.1	
0205	2.1	
0305	2.1	
0400	2.2	
0510	2.1	
0600	2.1	
0700	2.1	
0805	2.1	
0907	2.1	
1010	2.1	
1105	2.1	
1200	2.1	
1310	2.1	
1400	2.1	

Differential Pressure

Date	Reading	Ints.

AAT Scrubber (PDI-1A)

Date	Reading	Ints.

AAT Scrubber

Perform the following day of the Testing:

Testing Date 27SEP18

Testing Start Time 9:00AM **Testing Completed Time** 12:00PM

CH: 8 CH: 6 CH: 10

- ✓ **Cycles running:** 33 / 2289054, 33 / 2289054, 420 / 2291693,
  Make sure cycle is loaded in Antares or AccuSolo.
- ✓ **Name of person doing the testing:** Dan Kremer **Company** ECSi.
- ✓ **Complete form G-F-EO-MNT-048**
- ✓ **Note glycol Level tank 3:** 155"
- ✓ **pH level:** .18.
- ✓ **Liquor flow rate:** 1600 **GPM.**
- ✓ **Glycol percent:** 20.5 **%. (Using Brix 50)**
- ✓ **Ship out 40 ml. glycol sample to CWM lab.**

Signature